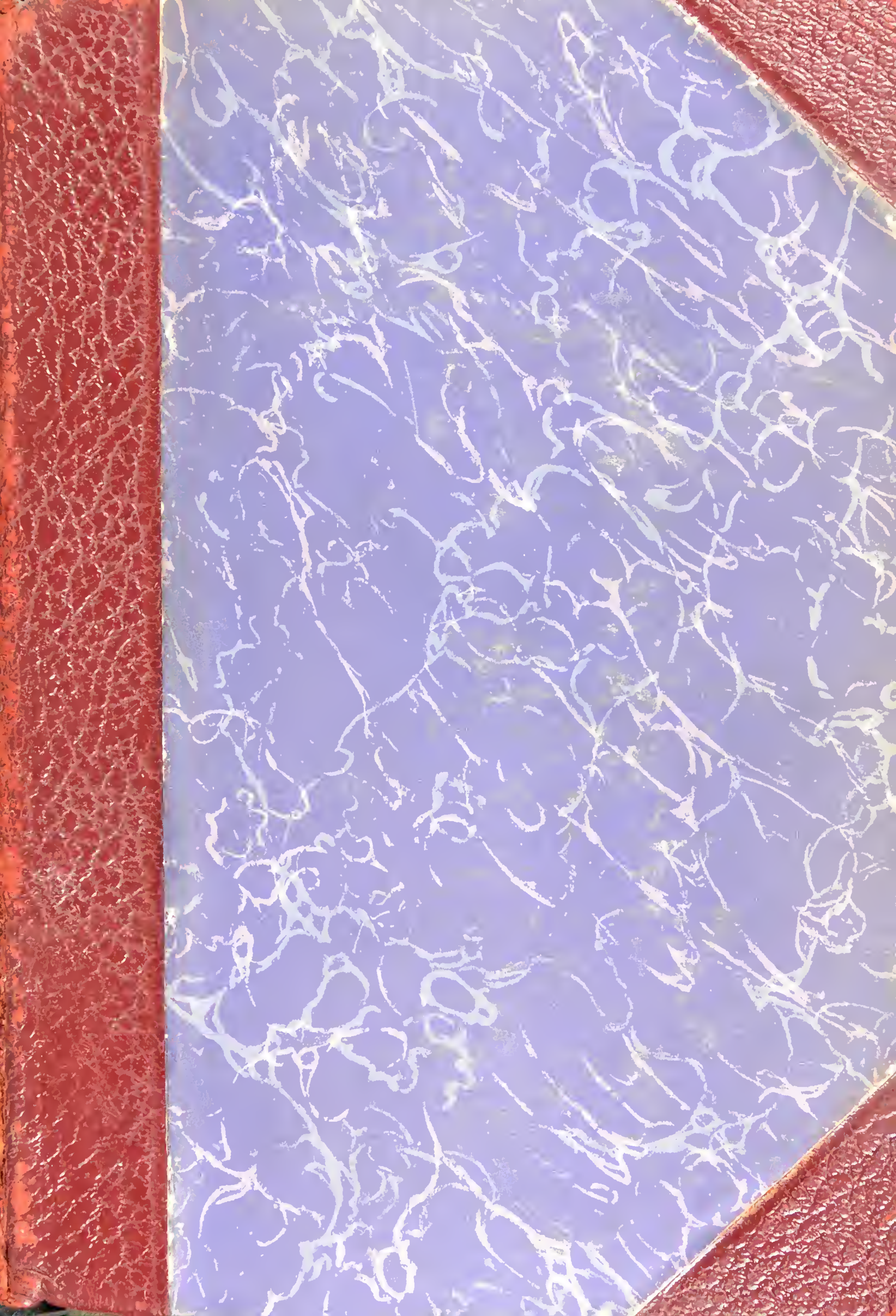

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OUTLINES
OF THE
SCIENCE AND PRACTICE OF MEDICINE.

SIXTH EDITION.

THE SCIENCE AND PRACTICE OF MEDICINE.

BY

WILLIAM AITKEN, M.D. Edin., F.R.S.,

PROFESSOR OF PATHOLOGY IN THE ARMY MEDICAL SCHOOL.

In 2 *vols. demy* 8*vo,* 2,300 *pages, with Steel Plate, Map, and nearly* 200 *Engravings, Price* 38*s.*

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THE SCIENCE AND PRACTICE

OF

MEDICINE.

BY

WILLIAM AITKEN, M.D., F.R.S.,

PROFESSOR OF PATHOLOGY IN THE ARMY MEDICAL SCHOOL; CORRESPONDING MEMBER OF THE ROYAL
IMPERIAL SOCIETY OF PHYSICIANS OF VIENNA, AND OF THE SOCIETY OF MEDICINE AND
NATURAL HISTORY OF DRESDEN; PATHOLOGIST ATTACHED TO THE MILITARY
HOSPITALS OF THE BRITISH TROOPS AT SCUTARI IN TURKEY
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TO

ALLEN THOMSON, M.D., F.R.S.,

Professor of Anatomy in the University of Glasgow, Member of the Council of Medical Education, &c.,

This Book is Inscribed,

IN

ADMIRATION OF HIS LIFE-LONG LABOURS IN THE ADVANCEMENT OF ANATOMICAL AND PHYSIOLOGICAL SCIENCE,

(The Basis of Scientific Medicine);

AS A MARK OF PERSONAL AFFECTION AND ESTEEM;

AND IN

GRATEFUL REMEMBRANCE OF HIS TEACHING,

AND OF HIS MANY ACTS OF KINDNESS, OF FRIENDSHIP, AND JUDICIOUS ADVICE,

BY HIS FORMER PUPIL AND ASSISTANT,

THE AUTHOR.

PREFACE.

ALTHOUGH, practically, it may not be possible to draw a line around a group of facts, and say that the whole of any one science is embraced within such an enclosure; nevertheless these *Outlines* comprehend a complete system, and within their boundaries I have endeavoured to enclose what is solid, practical, and essential for the student to learn in the Science and Practice of Medicine at the outset of his career.

It has been my object to give in the following pages a SYNOPSIS of the most elementary facts regarding the NATURAL HISTORY of diseases; especially, also, to simplify the *Signs for Recognising* them (*diagnosis*), and the *Rules of Practice* as to the *Prevention* and *Treatment* of them on which we can best rely,—believing that they are based on principles justified by *Reason*—from our experience and knowledge as to the causes, origin, progress, and termination of diseases.

The work is expressly designed for the use of students; and therefore I have endeavoured to define *the subjects for study* as clearly as possible—to give the *Natural History of diseases* as concisely as possible—and to indicate as fully as space permits *the lines of treatment* by which remedies are to be applied for the Prevention or Curative management of individual diseases. Thus, I have attempted, (1.) To furnish such a digest of the Science and Practice of Medicine as may be an aid to the memory and a help to the student in preparing for examinations; (2.) to furnish a guide to him in acquiring a systematic and practical acquaintance with all those details which are now required to be learned according to the best modern methods of Clinical Observation. Instruction in these methods will be found in two places in the book:—*First,* Under the head of "CASE-TAKING" ample details are given as to the *methodical examination* and *questioning of patients,* and *recording the results* in a *Medical History* of the case;—*Second,* Sections are given which treat of *the methods of Clinical Investigation* introductory to those diseases which are described in groups under the organs or systems to which they respectively belong —a method which I had previously followed in the several editions of my larger work on the *Science and Practice of Medicine;* to which this little work may serve as an introduction, bringing its scope, material, and bulk within such *graspable* and *portable* limits that the student may easily carry it about with him as a clinical guide and companion in the Wards of the Hospital, and an aid to his memory in the Lecture Room.

WOOLSTON, NEAR SOUTHAMPTON,
September, 1874.

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OUTLINES
OF
THE SCIENCE AND PRACTICE OF MEDICINE.

PART I.

TOPICS RELATIVE TO PATHOLOGY.

CHAPTER I.

PRELIMINARY DEFINITIONS AND EXPLANATIONS.

Medicine is prosecuted as a Science and as an Art, with the practical object in view of so learning to understand the nature of diseases, and to appreciate their causes, as to prevent their occurrence when possible, promote their cure when they do occur, or relieve the sufferings of those whose diseases cannot be cured.

The Practice of Medicine thus divides itself into two distinct branches, namely:—*First.* The Prevention of Disease, and Maintaining the Conditions for Preserving Health (*Hygiène*); *Second.* The Cure of Disease, and the Relief of those who Suffer (*Therapeutics*).

Eventually, the Practice of each of these separate divisions of the Science of Medicine will be undertaken by separate classes of men, each class being specially trained for the respective ends in view, namely:—(1.) Sanitary Officers, whose duties consist in maintaining the conditions for preserving health, and legally enforcing the means for the prevention of disease, in accordance with the several Sanitary Acts and Public Health Acts passed by Parliament; and (2.) General Practitioners of Medicine, whose duties consist in the cure of diseases as they inevitably occur. Both these classes of professional men must become acquainted, as Students, with the elementary facts which are comprehended in the Science and Practice of Medicine, and which it is the object of this little book to teach in outline.

HEALTH implies that state or condition in which a person exists, being fully able, without suffering, to perform all the functions and duties of life—possessing the normal activity of all the component parts of the body. Thus, many degrees of health are possible, from the possession of a feeble existence to the most robust condition.

The phenomena of disease are the normal vital manifestations of the body under the influence of some unusual, hurtful, or dangerous condition, which is known as the "morbific cause."

DISEASE is therefore some deviation from this normal activity of function; and if the deviation from the normal activity of function be accompanied by appreciable alteration of structure, the disease is then said to be *structural* or *organic*. If there be no appreciable change of structure, the disease is said to be *functional*.

The Natural History or Biography of disease comprehends:—

First. The morbid phenomena or symptoms by which the presence of disease is recognised (Symptomatology or Semeiology).

Second. The agents or specific causes by which diseases are brought about, produced, or generated (Etiology, or Causes of Disease).

Third. The exact seat or locality of structural diseases.

Fourth. The nature and extent of morbid textural alterations (technically called Lesions), which result from disease existing for some time, and which are the "stamps," "anatomical signs," or evidence of its having existed—studied in connection with the symptoms, causes, and course of the disease during life (Morbid Anatomy). See *Science and Practice of Medicine*, by the Author, Sixth Edition, vol. i., chaps. 1 to 6.

Fifth. The elementary constituents of the disease-products (Morbid Histology).

SYMPTOMS can only become *certain* SIGNS *of diseases* when their nature is clearly understood, and their significance interpreted. They are of several kinds, but two kinds are especially noticeable,—*subjective* and *objective*.

SUBJECTIVE SYMPTOMS are those which are appreciable by the patient only—e.g., *pain*, *dizziness*, *impairment*, or *alteration of the functions of the special senses*.

They indicate the commencement of many serious diseases; but from their nature they are apt to be deceptive alike to the patient and to the physician. The sensation of heat and cold, for example, may be exaggerated by the patient; and the description given of all subjective symptoms must be carefully considered by the physician as to their probable truth; and checked, if possible, by the objective symptoms or physical signs and general surroundings of the case.

OBJECTIVE SYMPTOMS are those which are appreciable by others, and which also may or may not be obvious to the patient,—e.g., *jaundice*, *increase of temperature*, *of respirations*, *of heart's action or pulse*. When rightly understood, they furnish important and valuable PHYSICAL SIGNS of disease.

The same individual symptoms are common to many diseases; and when certain symptoms constantly occur in groups, and in uniform succession, they indicate very definite and specific diseases, of which they are the *signs*. Certain symptoms, or groups of symptoms, are peculiar or distinctive of certain diseases, so that whenever they appear they indicate with certainty the particular disease; and so clench the diagnosis, if any doubt existed before. Such *symptoms* are said to furnish pathognomonic *signs* of disease—*e.g.*, the peculiar eruptions of some specific diseases superadded to the febrile phenomena and other symptoms.

Symptoms are still further distinguished as "*general or constitutional*," when they affect the whole system, and are significant of general disease—e.g., *specific fevers and certain eruptions*. "*Local symptoms*" are those which are limited to a particular part or organ.

When symptoms are convertible into SIGNS, a DIAGNOSIS of the disease is made.

Sometimes the SIGNS of disease are capable of being connected with lesions of structure or disorder of function; and so a diagnosis, not only of the nature of the disease, is required, but a diagnosis, as to the nature of the lesion or disorder of function, is also of importance. See *Science and Practice of Medicine* for the conditions under which the physician arrives at such diagnosis.

To know the CAUSES of disease is the first step to a knowledge of the means for prevention, both as regards development and propagation or spread; as well as the first step towards cure.

THE CAUSES OF DISEASES are either (1.) *predisposing* or (2.) *immediately exciting*. The former have been long in operation before the disease appears; the latter immediately precede its appearance; and although it is impossible to distinguish them accurately in all cases, yet this distinction, and also the very frequent *concurrence* of both kinds of causes in producing disease, must always be remembered. Under the former (*predisposing causes*) are comprehended all those conditions of existence which render a person unable to resist the influences of the immediately exciting causes of disease (*morbific influences*), and so favour their development and spread. These conditions of existence comprehend *age*, *sex*, *hereditary tendencies* (constitution), *temperament*, *idiosyncrasy*, *general impairment of constitution*, *vulnerability*, *debility*, *anæmia* or *plethora*. The transmission of the tendency to certain diseases from parents to children, is only part of the general fact of the influence of constitutional or anatomical peculiarities of parents on their offspring. A knowledge of the personal constitution of the patient is, in this respect, of great value to the practitioner, and not less so to the patient himself, as shewing the importance of avoiding, or fortifying the constitution against, exciting causes of disease, which very often co-operate with the hereditary tendency to produce disease.

The *predisposition to disease from hereditary constitution* is exemplified in the following affections, namely:—Gout, rheumatism, scrofula, tuberculosis, syphilis, cancer; certain forms of diseases of the nervous system, such as epilepsy, mania, melancholia, hypochondriasis, neuralgia, paralysis, chorea; also various other conditions, such as physical deformities, and impairments or absence of organs or parts of special sense, degenerations of blood-vessels, premature decay, baldness, loss of teeth, psoriasis, lepra, emphysema, asthma, diabetes, gravel, and calculous disorders.

In some instances a few of these inherited diseases are known to appear at birth (*congenital*), having developed themselves while the fœtus was still *in utero;* while the appearance of others is more frequently determined by the application and concurrence of other causes—"exciting causes."

Atavism is the name given to the occurrence of hereditary disease when it passes over one generation in a family history, without affecting any of its members, and then appears in the next generation.

The exciting causes of disease are:—

(1.) Peculiar and specific disease-poisons, giving rise to the well-known specific diseases whose symptoms and course are as constant, uniform, and specific now as of old, such as small-pox, measles, scarlet fever, typhus fever, typhoid or enteric fever, relapsing fever, malarial fevers, specific yellow fever, syphilis, hydrophobia.

(2.) Chemical poisons or irritants.

(3.) Mechanical injuries or irritants.

(4.) Errors of diet (by food or drink), by deficiency, excess, or unwholesomeness of quality. Deficiency of pure air and of muscular exercise.

(5.) The action of heat and cold—especially of long-continued heat—and the absence of the invigorating influence of occasional reduction of temperature: of long-continued cold not sufficiently counteracted by artificial warmth or muscular exercise.

(6.) Suppression of habitual evacuations.

(7.) Excessive and repeated evacuation, either by loss of blood or of the serous part of the blood.

(8.) Excessive exercise, exertion, fatigue.

(9.) Sudden shock, prolonged mental anxiety, with deficiency of the natural relaxation of sleep, depressing passions of the mind, especially those of longest continuance, emotion and over-sustained mental exertion.

(10.) Previous debilitating disease, either acute or chronic.

(11.) Condition of soil and water as agents in producing *endemic* disease, such as goitre, cretinism, guinea-worm, elephantiasis, pellagra, or malaria.

Observations as to the causes of disease are best made on large bodies of men—as in the experience of military and naval practice. But there are certain elementary facts now well established—by ample experience, by occurrences within individual observation, and by special statistical returns—which may be here enumerated, namely:—(1.) The greater amount of disease and mortality in large towns, and especially in the worst aired parts of towns, as compared with agricultural districts; (2.) The greater amount of disease in seasons of scarcity, as compared with seasons of plenty; (3.) The greater amount of disease amongst the poorer classes of society, and of hot or very cold climates, as compared with those in comfortable circumstances, and habitually protected from the extremes of temperature; (4.) The greater amount of disease amongst convalescents from acute diseases, compared with persons previously healthy; (5.) The greater amount of diseases amongst the intemperate, as compared with the sober; (6.) The greater amount of disease in beaten armies, or among depressed and disheartened individuals, as compared with victorious armies, or more fortunate, flourishing, and well-to-do members of society; and (7.) Generally it may be stated that no circumstance in the condition of mankind so uniformly increases mortality and promotes disease as destitution, particularly in large towns; (8.) More or less of a contagious property is possessed by certain specific diseases, namely,—small-pox, chicken-pox, measles, scarlet fever, typhus fever, enteric fever, relapsing fever, dengue, dysentery, influenza, cholera, certain parasitic diseases, syphilis, gonorrhœa, soft chancres, purulent ophthalmia.

But in ascribing this property of contagion to these and other diseases, it is not to be understood as determined that contagion is the only exciting cause of any one of them. These diseases also are not equally nor alike contagious one with another; nor does the contagious property exercise its influence similarly in all of them. Some of them may occasionally *originate* from causes still not definitely determined, and perhaps extend themselves in an unknown way, besides being propagated by contagion; and with regard to some of the forms of fever originating in malaria, there is some evidence to shew that they may occasionally, and under certain circumstances, spread by contagion, especially the malarious form of yellow fever.

CHAPTER II.

CASE-TAKING—THE METHODICAL EXAMINATION OF PATIENTS AND RECORDING MEDICAL CASES.

The systematic examination of patients and recording the results of the inquiry in writing, commonly called "case-taking," should be practised from the earliest possible period of clinical study. To elicit the facts of a case with facility and precision requires continual practice. A careful examination of the patient is the first requisite for a correct diagnosis. Some well-prepared plan is necessary to accomplish this, and should be adopted and followed out by every student as the best method of training to that accuracy of observation, which is at once a necessity and a leading feature of the practice of medicine of the present day. If the attempts of a beginner are watched, who sets about the examination of a patient without any definite method, it will be seen that he wanders in his inquiries from one part of the body to another. He is attracted by varied and different symptoms; he asks pointless and fruitless questions, and finally jumps at hasty conclusions, which are generally erroneous; or he fails altogether to make up his mind as to the nature of the case he has before him.

Directions have been given by many authorities for acquiring and habitually following a definite system of examining patients, especially as to what are the essential points to be elicited and recorded in case-taking. A skilful practitioner may be able to learn the truth of a case in any order, or in no order; yet it is very desirable that a regular order should be followed by learners. The habit so acquired will eventually become a necessity, and will be found most useful in practice.

A combination of a *regional* or *physiological* plan seems to be the simplest, inasmuch as it ensures a thorough investigation of the whole organism. (Dr. Sanders, in *Edinburgh Medical Journal* for November, 1873.) The student being already familiar with the division of the body into anatomical Regions, the Systems of organs are to be examined in connection with the anatomical region to which they respectively belong. The method has therefore also this advantage, that the existing symptoms of disease will come to be arranged in such scientific groups as will most readily and naturally lead to the detection of the causes which account for them, and nothing can be neglected or omitted which may throw light on the nature of the patient's ailments.

The following is the outline or skeleton-plan for "*taking a case*" according to this method; and suggestive hints are added under the several appropriate headings for the kind of information to be sought for in the examination of each region and system.

The *order or method of examining* a case should be the same as the *order of recording or reporting* the results in a case-book, and the written description ought to be a full and accurate statement of facts as seen, heard, felt, or otherwise appreciated by the examiner. No theory or conclusion ought to be embodied in this part of the report—all conclusions or theories must be worked out at the termination of the inquiry, and embodied under the heading of "*Diagnosis.*" For example, it is not admissible to record the existence of *tubercle*, or *inflammation*, or *cavities* in the lungs. It is only admissible to state any symptoms or physical signs which have been discovered in the lungs.

But before subjecting any patient to such a prolonged systematic examination as is set forth in this chapter, it is necessary to observe and determine the following points :—

(1.) Whether the case is obviously a *febrile* or a *non-febrile* one—as shewn by the temperature of the skin and the number of pulse-beats.

(2.) Whether the patient is sufficiently intelligent as to be able to answer questions.

(3.) Whether the patient is in a condition as to bodily strength to undergo the fatigue of a protracted physical examination.

If it is found that the patient suffers from fever, or is delirious, or is in a weak or dangerous condition, the facts should be recorded, and the further course of examination must be modified accordingly.

Skeleton-Form or Scheme for Examining and Recording a Case.

DISEASE, } Here the *name* of the disease and result of the case
RESULT, } should be filled in only after the case is completed.

I.—Preliminary Information.

1. *Name*, (and, of course) *sex*, *age*, *occupation*, *date*, *residence* at home, or if in an hospital, the number and name of *ward* and *bed*.

2. *Complaints* (*a.*) as stated by the patient himself, or (*b.*) as reported by his friends; also, (*c.*) any very obvious morbid appearance, such as *jaundice*, *anæmia*.

3. *History* (*a.*) of present ailment; (*b.*) of previous healthiness or diseases; (*c.*) of social condition and habits, lodging, especially as to efficiency of shelter and clothing; condition of drainage and water supply; food, drink, temperance or intemperance; irregularities as to living or excesses of any kind; the previous or *present* existence of syphilis and use of mercury, exposure to contagion or infection, with inquiry as to the existence of epidemic diseases; exposure to extremes of heat, cold, or wet in various climates; length of residence in extreme climates; (*d.*) family history, especially as regards parents, brothers, sisters, and children, with reference to any history of diseases amongst them known to be hereditary.

The inquiries here instituted are with special reference to the causes of disease as given at the end of the previous chapter.

Patients ought to be allowed to begin the account of their ailments in their own way. They ought also to be requested to give a date, if possible, to the very first deviation from health which they experienced, and how this was manifested; the order of occurrences since that time, and the origin of any new symptoms. The story of the patient must then be subjected to such crossexamination as the nature of the case suggests. The questions must be put with mildness, and the replies listened to with kindly interest; and all personal examinations conducted with prudence and delicacy.

The first inquiry should be as to what direction his present sensations point to evidence of disease, always bearing in mind that sometimes symptoms seem to point to one organ when another is actually diseased: such, for example, as vomiting, significant of cerebral disease, or of the presence of a renal calculus; or of pelvic or abdominal tumors, or of pregnancy; pain in the right shoulder, significant of hepatic disease; pain in the region of the sacrum, of disease of the uterus; pain in the thigh and testicle, as significant of nephritis; pain in the knee from disease of the hip; in the urethra, from stone in the bladder. Such pains and symptoms are sometimes called *sympathetic.*

The patient is always apt to have some theory or belief as to his ailments; and hence two important questions ought always to be put to him in a particular form, so as to elicit the statement of two important facts. These questions are—(1.) "*How long have you been ill?*" and (2.) "*Where do you feel pain or discomfort or uneasiness?*" To obtain a reply, as definite as possible, to the latter question, the patient ought *to indicate the seat of pain by placing his hand over the region.* If pain thus indicated by the hand is alleged to be circumscribed to a part of the surface, the place referred to ought at once to be examined by sight and by touch.

With reference to the first question—how long the patient has been ill—the period of commencement is usually fixed as regards acute inflammation and febrile diseases, by finding out when the first rigor or chill was noticed; but in chronic ailments a good deal of inquiry is necessary to get at the truth regarding the first beginnings of disease.

II.—Present Condition—Regional Examination.

This is to be determined by (A.) "EXTERNAL (REGIONAL) INDICATIONS;" and (B.) "INTERNAL (REGIONAL) EXAMINATION."

(A.) "EXTERNAL (REGIONAL) INDICATIONS."

These are to be inquired into under the following heads:—

(1.) *General Condition* as to conformation or development; height and weight ought to be accurately measured, and condition as to muscularity made a note of; also, bulkiness, nutrition of body, or emaciation; any loss of weight or of strength should be inquired into; posture or attitude of the body, as indicative of debility or of helplessness, is to be observed.

A bulky aspect suggests either corpulence or general tumefaction. If the bulkiness is most expressed in the abdominal region, it may be due to omental fat or to ascites. General bulkiness of the body, when not due to corpulence, may be tumefaction, due to the presence of fluid or air in the areolar tissue. If due to air, the tissue will crepitate under the fingers; if due to fluid, the skin will pit on pressure. A history of diminishing bulk suggests wasting, which, if continuous, generally points to some impairment of nutrition, the cause of which is to be sought for. Such wasting occurs during protracted febrile states, and most chronic abdominal diseases, and in slow but malignant diseases—cancer, diabetes, phthisis; and when discharges are continuous, as in chronic dysentery, diarrhœa, and suppurations. The loss of flesh (emaciation) is more marked and excessive in chronic dysentery than, perhaps, in any other disease. It becomes most obvious in the face by the subsidence of certain parts, as the tissue about the eyeballs and the zygomatic arch, from the absorption of fat; and the prominences of the long muscular bundles in the neck, and their attachments.

With regard to the position, posture, or attitude of the patient, it should be observed whether and how he lies (mode of *decubitus*); and whether and how he walks, as suggestive of impaired health or acute disease. A sudden and imperative obligation to lie down in bed, suggests an acute, a severe, and perhaps a dangerous disease. Lying for a long time on the back (*dorsal decubitus*) is suggestive of *exhaustion*, as in some fevers—of *paralysis*, or *pain increased on pressure or motion*, such as that of *peritonitis* or *rheumatism.* Lying on one and the same side, suggests impaired action of the lung on that side; respiration being carried on with the sound lung of the opposite side. But this rule is not absolute.

Inability to lie down, and the obligation to sit up more or less erect, suggest a form of *dyspnœa*, or distress in breathing, unless when sitting erect or leaning forward. To this condition the name of "*orthopnœa*" has been given; and it is met with especially in diseases of the heart, œdema of the lungs, or extensive effusion into the pleural cavities in laryngitis, congestive or asthenic pneumonia, and in severe cases of epidemic influenza. A restless mode of lying down accompanies severe thoracic inflammation and acute rheumatism.

The position of the head, shoulders, trunk, and limbs ought each to be separately observed—the head as to whether it lies low or hangs over—the body, as to whether the patient lies prostrate, motionless, flat on the back (*supine*) or on the face (*prone*)—the limbs, as to whether they are outstretched, flaccid, and relaxed, or drawn up, bent, or fixed in any definite position; whether the patient has put himself into any particular posture to relieve pain or pressure upon a part which gives pain.

The movements of a patient when still able to walk about are to be noted as to erectness, quickness, and firmness of gait, or the reverse. Weakness from illness is associated with a stooping, slow, and difficult gait. Stooping is suggestive of spinal disease, or some affection of the larger joints of the lower limbs. A staggering gait suggests *cerebral* *disease;* laborious or one-sided movements suggest *paralysis;* uncontrollable or excessive movements are suggestive of *chorea* or *mania;* trembling motions point to *extreme debility, blood-poisoning of the typhoid state*, or *delirium tremens*.

(2.) *Aspect of the Features, and Expression of the Countenance.*—The patient should be so placed that the light falls fully on his face. Pallor, as of anæmia, chlorosis, or "shock," is to be distinguished one from the other; so also the localised flush over the malar bone of "*hectic*," in phthisis, specific fevers, pneumonia; the duskiness, cyanosis, and lividity suggestive of cardiac and pulmonary mischief. A pallid, white, glazed, or pasty look of the skin of the face, is suggestive of certain forms of renal disease; and, combined with puffiness, or œdema of the skin, over the eyelids and underneath the eyes, points to the existence of Bright's disease, or chronic valvular disease of the heart.

The *expression of the features* may suggest "*shock*," as of injury, when combined with pallor, anxiety, and a frightened look. The eyes may then be fixed or oscillating, with a contracted pupil. The *expression* also may be simply that of pain or anxiety, or unnatural indifference; or it may be suggestive of forms of mental diseases, such as *mania*, *melancholia*, or *dementia;* or of other nervous diseases, such as *epilepsy* or *hysteria.*

The *expression of feature* may be different on the one side of the face compared with the other. A serious or dull expression may exist *on one side*, while the other side is perhaps playfully expressive, as in laughter. Such features indicate *facial hemiplegia* or *paralysis*, with or without muscular twitching, commonly called "*Tic*," and with or without convulsions, squinting, or alteration of the pupils.

An expression of stupor or apathy, with a dull and listless eye, paleness on sitting up in bed, or flushed if lying down in bed, is common in febrile states of a typhoid type, with black accumulations, called "*sordes*," on lips, gums, and teeth.

A bluish or cyanotic appearance of the lips denotes impaired circulation, so that the blood is imperfectly ærated. Fulness, or turgidity, with congestion, especially veinous, of the surface of the face, is most frequently found with cardiac hypertrophy and habitual ingestion of alcohol, in apoplexy, and in typhus fever. A dusky flush over the face, with increased rapidity of breathing, suggests pneumonia. A pinched, sunken, worn expression of face suggests pain or anxiety, acute peritoneal inflammation, constant suffering from chronic disease—the forerunner of approaching death, especially if there be also "a sharp nose, hollow eyes, collapsed temples, the ears cold and contracted, skin about the forehead rough, distended, and dry, and colour of whole face greenish, black, livid, or lead-coloured" (*Facies Hippocratica*). Retraction of the corners of the mouth to the extent of a "sardonic grin," is suggestive of inflammation, implicating the diaphragm; or of painful affections of the stomach or bowels, near the tendinous apeneurosis of that muscle.

A straw-coloured, anæmic appearance of the skin is suggestive of the ill health (cachexia) of malignant disease. Jaundiced face, with a melancholy air, is suggestive of hepatic disease. A downcast expression, elongated upper lip, and mobile features, are suggestive of hysteria. Thickened upper lip, delicate skin, and fair complexion, are suggestive of scrofula.

(3.) *Condition of the General Cutaneous Surface*, as to temperature, perspiration, eruptions, tumors. Increase of temperature is to be measured accurately by a thermometer; and, with quickened pulse, it is a sure sign of fever. (See under this head in *Science and Practice of Medicine*, by the Author, vol. i.) Dryness of the skin is suggestive of arrested secretion generally, and of defective perspiration in particular. General coldness of the skin betokens a weakened capillary circulation—a condition common to the invasion of many acute diseases. A cold, moist skin in severe disease is evidence of collapse; and a clammy skin generally indicates debility. Marked paleness of the skin is suggestive of a poor and watery blood, or of an internal excessive hæmorrhage. Eruptions, other than those of special skin diseases, suggest the existence of some exanthematous or contagious fever. Petechiæ or extravasations of blood suggest the existence of a scorbutic or purpuric condition, or greatly altered blood, by decomposition during life, as in some form of putrid or malignant fever, with so-called typhoid symptoms.

To determine the condition of the skin, the examination should first include the face and neck, next the shoulders and back, chest and abdomen, and lastly the extremities, hands and feet.

(4.) *Condition of the Limbs and Joints.*—Apart from paralysis, loss of power in the limbs is suggestive of *typhus fever*, or some exanthematous fever; the prostration of muscular power being excessive in all such kinds of fevers, and always attended with flaccidity of the muscles, indicating impaired rigidity and tone of muscular fibre, and loss of irritability. *Continued tremors*, or constant shaking of a limb, or frequent twitching of a muscular part, are suggestive of irritation at the origin of the nerves supplying the limb or part. *Cramps* or *spasms* of the limbs suggest irritation of the bowels, and the existence of acidity or flatulence from impaired digestion, or of gout, when they affect the lower limbs. When they implicate more than the lower limbs, they are usually of serious import—as in *cholera*, *phrenitis*, or *apoplexy*, in *fevers*, and the *puerperal* state; and the convulsive movements in the mania of Bright's disease. Tumid conditions of the joints, and relaxation of their ligaments, singly or in conjunction, suggest predisposition to scrofulous affections. Symptoms of the joints being affected are suggestive of *rheumatism* or *gout* as the source of disease; or of the digestive or assimilative functions being impaired, particularly when the functions of the liver, bowels, or kidneys betray disorder. Affections referred to the joints are also sometimes suggestive of *hysteria*.

Having thus taken a general survey of the patient and of his history, which cannot fail, in crossexamination, to point to prominent symptoms of disease or illness—if any disease or ailment exists—it also must furnish some clue to the region, organ, or system likely to be most affected, so that the PRESENT CONDITION, as determined by (B.) REGIONAL EXAMINATION OF SYSTEMS, will complete the inquiry. This examination ought to commence with the region presumedly the most diseased; but whatever region is commenced with, it is necessary that the investigation and recording, as to the condition of all the systems of one region, be completed before going on to another.

(B.) INTERNAL REGIONAL INDICATIONS.

HEAD.—*Nervous System.*

(*a.*) *Peripheral Indications.*—Condition as to motion, sensation, special senses—taste, smell, vision, state of pupil and influence of light on it, examination of eye by ophthalmoscope, movements of tongue, as suggestive of the state of the brain and organic nervous system.

Impairment or alteration of *vision* or functions of the eye and eyeball are mostly suggestive of cerebral mischief. The *sense of smell* is influenced, not only by the brain, but by the state of the respiratory passages as well. *Taste* is very closely connected with the state of the digestive functions, as well as with the brain. The impression that ought to be made through any one of the special senses may fail; (1.) from the special organ not being itself in a normal condition to receive the impression; (2.) from the nerves of special sensation not being able to transmit the impression to the brain (atrophy, injury, wounds, tumors, morbid deposits pressing on them); (3.) although the impression may be received and transmitted, the brain itself may be diseased at the parts connected with the origin of these nerves of special sense.

The fact of any function of special sense being suspended, increased, diminished, impaired, or perverted, suggests the existence of cerebral disease, or of fever, or disorder of digestive functions.

(*b.*) *Central Indications:*—Brain and spinal cord, as to feelings of exhaustion or the reverse; intelligence, dulness, or stupidity; lethargy, or sleepiness; wakefulness and activity; headache, vertigo, stupor, coma, nausea, pains in the back; general sensibility increased, diminished, absent, or impaired (using the anæsthesiometer); spinal irritation to be determined by percussion, pain on movement, and the existence of special spinal symptoms. (See preliminary chapter to Diseases of the Brain, in *Science and Practice of Medicine*, vol. ii., by the Author.)

THORAX.—(*a.*) *Respiratory System.*

1*st. Symptoms.*—Note the number of respirations per minute (16 to 18 per minute being the normal number in the adult, or one for every four beats of the pulse); if easy, calm, and full drawn, or difficult, painful, or laboured, short, forced, hurried, and incomplete; whether the breathing is attended with pain, or is checked or arrested at a certain limit of expansion by cough, with or without pain; whether respiration goes on through mouth, nose, or both; whether the movements are mostly expressed by the diaphragm and abdominal muscles (abdominal respiration); whether the alæ of the nose dilate and contract at each respiratory effort, with forcible and constrained movements; cough, sneezing, expectoration, quantity and character of the discharge—thin, inspissated, frothy, mucous, purulent, or both; rusty, bloody—(microscopic examination) odour of the breath, hæmoptysis.

2*nd. Physical Examination*, by inspection (external form of the chest and its symmetry), palpation, percussion and auscultation of organs. (For an account of the regions of the chest and their contents, see preliminary chapters to investigation of Diseases of the Thorax, in *Science and Practice of Medicine*, under these heads.)

(*a.*) *Peripheral Indications.*—Nose, action of *alæ nasi;* larynx, voice (use of laryngoscope), trachea. If speech is affected, the condition of the epiglottis, tonsils, and pharynx must be observed by means of an examination with the aid of a spatula, designed for that purpose, to depress the tongue.

(*b.*) *Central Indications.*—Lungs and pleuræ are to be carefully examined in every part by percussion and the stethoscope.

(*b.*) *Circulatory System.*

1*st.* *Symptoms.*—Cardiac dyspnœa, palpitation, uneasiness or pain at precordia, syncope, angina pectoris.

2*nd.* *Physical Examination* of the heart and blood-vessels by inspection, palpation, percussion, and auscultation. (See preliminary chapter to investigation of Diseases of Heart and Circulatory System in *Science and Practice of Medicine.*)

(*a.*) *Peripheral Indications* from arteries, especially radial and carotid; from pulse, as to its number, character, variations, and use of sphygmograph; also from veins, of neck especially.

(*b.*) *Central Indications.*—Heart and large vessels within the thorax; microscopic examination of blood; question as to existence and probable nature of intra-thoracic tumors (aneurisms or enlarged glands). The two sounds of thoracic aneurism—as distinguished from the single sound of abdominal aneurism. Condition of lymphatics and lymphatic glands.

To feel the beat of the pulse at the wrist must never be neglected. It is popularly believed to be indispensable to the understanding of a case. The action of the heart is to be judged of by the pulse, and also the state of the artery as to pressure or expansion by the blood. In a healthy adult, the pulse beats at the rate of 65 to 75 times in the minute, and indicates a like number of contractions of the left ventricle. It becomes slower with advancing years (60 to 65 in old age). In infancy, the rate is from 110 to 120; and in a child three years of age the rate of pulsation is from 90 to 95 or 100. Warmth and heat quicken the pulse; so does rapid breathing and exercise, or mere exertion, forced expiration, and the process of active digestion.

In the recumbent position, and during sleep, the pulse is slower. Increased frequency suggests some cause exciting the action of the heart—such as exercise, restlessness, mental emotion, fevers, or acute inflammation. The pulse has also more frequency and less force in fever than in inflammation, when it has greater force and less frequency. Besides its frequency per minute, its rhythm, its volume and strength, and its resistance must be noted. A slow pulse is suggestive of shock, depression, pressure on the brain; and is common also in cases of jaundice.

The rhythm of the pulse is perverted when the beats do not follow each other in regular succession, but occur at unequal intervals, and when one or two beats intermit. Such irregularity in rhythm suggests digestive impairment, or mere debility; but may frequently indicate cerebral or cardiac mischief.

The volume of the pulse is measured by its fulness or distension with blood—the vessel being more or less completely and fully expanded with each beat of the heart. A hard or wiry pulse is one which combines smallness with force. A soft pulse is one which combines largeness with want of force.

A full and strong pulse suggests plethora. It is the pulse of youth and robust health, as well as of inflammatory disease—the early stage of many fevers, and of general capillary obstruction.

The sphygmograph attempts to obtain and indicate to sight that kind of information which the physician acquires by "*tactus eruditus;*" and the student is referred to the preliminary section introductory to Diseases of the Heart and Circulatory System, in the second volume of the *Science and Practice of Medicine.*

When symptoms connected with the heart are present with acute rheumatism, rheumatic fever, or arthritis, they are suggestive of some one of the following affections:—Acute pericarditis, dry or with serous, sero-purulent, or hæmorrhagic effusion; acute endocarditis, singly or combined with pericardial inflammation; acute myo-carditis, singly or combined with peri- or endo-cardial inflammation, or both; acute aortitis, singly or combined with the previously named lesions. In continued fever, like typhus, it suggests softening of the muscular texture of the heart itself.

ABDOMEN.—*Digestive System.*

Examine as to symptoms and physical signs from the *alimentary passages*, from the entrance by the mouth to the outlet by the anus. Symptoms are furnished by the teeth and gums, tongue and throat, deglutition (examination of throat with spatula), appetite (or the reverse) for food and drink, stomachal and bowel digestion, vomiting, character of matters vomited, flatulence, stomachal and intestinal eructations, regularity of bowel evacuations, and nature of the stools.

Perfect and enduring teeth suggest soundness of constitution. Their early decay suggests impaired constitutional power, or prolonged disorder of digestive functions. *Grinding* of the teeth during sleep has a varied significance, according as the patient is a child or adult, or is aged. In children it is suggestive of intestinal worms or of cerebral disease, in which latter state it is generally associated with a bright eye, a contracted pupil, and a flushed cheek, startings in sleep, followed by convulsions and meningitis. In adults and aged it is suggestive of an apoplectic or paralytic attack. It is an unfavourable symptom during contagious fevers, as suggestive of cerebral complications.

Accumulations of tartar around the teeth at the margins of the gums suggest a disposition to calculous, gravelly, or gouty affections.

Inordinate sensitiveness of the teeth suggests nervous diseases, acidity of the stomach, and impaired digestion. The teeth become loose in scurvy, purpura, and during mercurial salivation; and the gums are often retracted from them, so that they appear elongated. This is common during chronic gastritis and chronic impairment of digestion. Note as to their cleanness, or crusting over with blood or mucus (*sordes*).

Paleness of *the gums and lips* suggests anæmia, chlorosis, and excessive loss of blood. A blue margin surrounding the teeth suggests lead contamination; a red spongy swollen appearance suggests mercurial poisoning, chronic disorders of digestion, diabetes, incipient scurvy, or purpura; and if these morbid states are prolonged, the condition of the gums becomes worse, so that they bleed, or become ulcerated and even gangrenous. Note their condition as to redness and moisture, lividity and congestion, herpes or other eruptions, creamy or black exudations and crusts (*sordes*).

The state of the tongue varies (1.) with the states of the several digestive functions; (2.) with the nature and stage of the prevailing disease; (3.) with the existence and amount of general constitutional disturbance, as respects especially the organic nervous system, vascular action, and sanguineous contamination or blood-poisoning. In examining the tongue, it must always be remembered that it may be coloured by food, or drink, or by medicines—that it may be abnormally dry also by constant breathing through the mouth, but less so in health than in disease.

The condition of the tongue, therefore, is taken to indicate the condition of the digestive canal, as to activity of function generally, the condition of the nervous system, the condition of the blood and state of the secretions.

Its movements, its volume, its colour, and its coating must be examined and recorded.

Impeded and tremulous movements of the tongue suggest exhaustion. It is protruded slowly and with difficulty in fever of a typhoid type, and in nervous disorders with marked debility, when it sometimes remains protruded, and in comatose, apoplectic, and paralytic conditions. Its movements are impaired in paralysis, and it turns to *one* of the corners of the mouth in hemiplegia, and when this is combined with imperfect articulation a serious deep-seated cerebral lesion is indicated.

A swollen, broad, and flabby tongue, as if it were too large for the mouth, and on the edges of which the teeth leave their impression, as in œdema, is suggestive of chronic impairment of digestion, generally from chronic visceral disease, or of the action of mercury or of some poisons. It is also seen in affections of the brain, or as a consequence of disturbed circulation attending disease of the heart, typhus fever, scarlatina, scarlet fever, small-pox, syphilis, and mercurial poisoning.

Swelling of the tongue suggests danger in cerebral affections, exanthematic and continued fevers.

Dryness denotes deficient secretion. It is seen in acute visceral inflammation, and is constant in continued fevers and the exanthemata. It is so dry in enteric fever sometimes as to cause the papillæ to appear prominent and the surface rough.

A fissured or lobulated condition of the tongue, combined with enlargement, suggests chronic impairment of the digestive functions, with hepatic disease.

A tumid and livid tongue, the surface being covered with a yellowish coating of milky or cream-like mucus, suggests disease of the lungs or heart, the urinary or uterine organs.

A very moist and soft tongue betokens debility, and suggests tonic and not lowering remedies.

When humidity appears after a dry tongue it is a favourable sign, the returning humidity appearing first at the edges of the tongue, whence it gradually extends over the surface to the middle line.

The dryness of the tongue is generally accompanied with roughness from the parched-up condition of the papillæ or fur, or it has a burnt appearance and fissured, and sometimes a dark or deep red hue. The most extreme of this dry condition, when thirst ceases to prevail, is a most unfavourable sign, as in the dry brown crusted tongue—the mahogany-like tongue of *typhus* fever.

Paleness of the tongue has a similar significance to paleness of the lips and gums—*i. e.*, suggestive of anæmia, chlorosis, loss of blood, or poorness of blood from excessive discharges or spleen-disease.

A very red tongue occurs in inflammations of the throat and pharynx, and in the exanthemata. Redness limited to the point and edges suggests acute irritation or inflammation of the digestive mucous surface in continued and remittent fevers, the surface and base of the tongue being at the same time loaded, coated, or furred. After having been thus coated over, if it becomes very red and clean, glossy and varnished like, and swollen at the tip, especially if fever does not abate, the condition is not favourable.

A white creamy tongue suggests catarrhal febrile states, with functional disturbance of the digestive and respiratory organs—the premonitory stages of fevers and inflammations.

A clammy sticky state, with redness at tip and edges, and with a white, yellowish-white, or milky-like fur on the surface and base, with more or less humidity, suggests visceral disease, inflammations of mucous surfaces, the early stages of fevers.

Regular, prominent, bright red points uniformly appearing above the white and creamy surface (strawberry-like tongue) suggests the fever of *scarlatina*, *measles*, or *small-pox*.

A loaded condition of the tongue in the mornings suggests impairment of the stomachal or bowel digestion, late suppers, smoking, and drinking malt or alcoholic liquors before going to bed.

A furred tongue resembles the pile on the surface of cotton velvet, from the erectness and development of filiform and fungiform papillæ. It varies in colour and thickness, and is generally covered by a clammy, dirty mucus—the fur and mucus together forming a coat on the base and dorsum of the tongue—the colour varying from a greyish-white or yellow to a brown or even black. Such a state of the tongue suggests parenchymatous inflammation of solid organs, severe irritation of mucous membranes, an adynamic condition in continued or exanthematous fever.

The throat and fauces, especially the *uvulæ and tonsils*, ought to be examined with the aid of a spatula to depress the tongue—as to vascularity, relaxation, aphthous spots or ulcerations.

Relaxation of the uvula, velum, or fauces, suggests general debility, with disordered stomach or catarrh. The tonsils are often enlarged from chronic congestion, or as an expression of general chronic derangement of health, or as a sign of a scrofulous constitution. They are generally enlarged, sometimes ulcerated or aphthous, in cases of exanthematous and continued fevers. Pressure ought to be applied upon them to determine if secretion (mucous or purulent) is pent up in their crypts.

With regard to *appetite for drink and food*, as suggestive symptoms, it is to be observed that the *desire for drink* is diminished in the advanced stages of fevers and inflammations; and, in such cases, when the tongue and mouth are dry, and fever does not subside, the absence of thirst, or of a desire for fluids or drinks of any kind, is of unfavourable import.

Increased desire for drink is present during the earlier stages of all febrile maladies. A diminution or entire loss of appetite (*anorexia*) for food is common at the commencement of most acute diseases, especially at the commencement of early stages of fever.

Nausea and vomiting suggest the digestive system, or the brain, as the source of the vomiting. It is suggestive of pregnancy, or hysteria, in the female, and, in either sex, of some irritation or tumors in or amongst abdominal or pelvic viscera. It is also present on the invasion or at an early stage of continued fevers and the exanthemata; also in epilepsy and diseases of the brain.

Eructations, *heartburn*, *gastralgia*, *retchings and vomiting*, *rumination*, *flatulence* (*gastric* or *intestinal*), *pyrosis* or *water-brash*, are all and each symptoms suggestive of impaired digestion. The period after taking food at which these symptoms come on is of importance to be noted; also the nature of the matters vomited, as to acidity, presence of blood, or of *sarcina ventriculi.*

The *intestinal evacuations*, as to their regularity and nature, should receive the most attentive examination as to frequency or abnormal retention. Retained or delayed evacuation is often a symptom attending—(1.) Severe disease of the digestive canal, or of the liver, spleen, kidneys, or sexual organs; (2.) Mechanical obstruction to the passage, or in it; (3.) Cerebral disease, or disease of spinal cord or their membranes, and different forms of insanity. Frequency of intestinal evacuations varies with age and habits. Infants evacuate the bowels twice or thrice a day; adults, as a rule, once only, and sometimes twice; elderly persons less frequently; and sedentary persons, especially females, who eat little, only once in two, three, or even more days.

Frequency of evacuations or purging suggests irritation and hyperæmia of the digestive villous surface—*intestinal catarrh*—which, when continued, becomes *diarrhœa.* Its presence in children may be associated with teething; and in adults suggests the taking of too much or improper food, or excesses in the use of alcoholic drinks; or the irritation of fæcal accumulations; or an excessive flow of bile into the bowels; or as a complication of continued or exanthematous fevers; or lardaceous disease of the intestines. Note the presence of localised symptoms, such as pains, tormina, gurgling noises (*borborygmi*), especially as localised in the right iliac fossa. The fæces are altered by disease in form, consistence, colour, odour, and quantity; in the nature of their constituents, and in the substances which may pass with them, or which they may contain.

(*b.*) *Walls and solid viscera of abdomen.*—Here the shape of the belly and measurement of its size are to be recorded; also pain, general tumidity, hardness, tympanites or flatulence; presence of swellings or tumors; distension or collapse; condition of peritoneum as to presence of fluid (*ascites*); of the ovaries; of the liver—its size and limits; of the spleen—its size and limits (microscopic examination of the blood); the condition of the pancreas and lymphatic glands are to be inquired into. (See introductory chapter on diagnosis of abdominal diseases, in 2nd vol. of the *Science and Practice of Medicine.*) Abdominal tumors require most careful examination; but, from the predominance of aneurism and malignant disease, the question is generally between these two; and between fibrous tumors, cysts, fœcal accumulations, extra uterine fœtation, abscesses (psoas, pericœcal, perinephritic, pelvic), and enlargements of glands.

Genito-Urinary System.

Micturition is to be noted as to its frequency, painfulness, or difficulty. The urine is to be examined in *every case*, and the following points noted:*—1. The *total quantity* passed in the twenty-four hours must be collected, and its amount measured—the normal amount being 30, 40, or 50 ounces. 2. The general appearance and colour; clearness or turbidity; presence or absence of deposits, and of extraneous impurities. 3. Odour. 4. Re-action. 5. Specific gravity. 6. Presence or absence of albumen, and, if present, an approximate estimate of its quantity. 7. Presence or absence of sugar; if present, an estimate of its quantity.

If there be a deposit, note—8. Its aggregation and colour; whether amorphous or crystalline, light or heavy; the manner of subsidence or precipitation. 9. Its solubility or insolubility by heat; solubility in nitric acid, in acetic acid, in liquor potassæ; insolubility in both acids and alkalies. 10. By the microscope—absence or presence of crystals, their appearance and form; of epithelial cells—renal or extra-renal; of blood discs; of pus globules; spermatozoa; tube casts; confervoid vegetations.

Difficult micturition is termed *dysuria;* when it amounts to extreme difficulty, it is known as *stranguria;* while *ischuria* means the suppression or retention of urine. All these symptoms are suggestive—(1.) Of diseases of urinary organs and passages; (2.) Abnormal conditions of the urine itself, or the presence of calculus or gravel in the bladder or passages; (3.) Diseases of adjoining, or even distant viscera, as in cases of dysentery, liver, spleen, uterine or ovarian lesions or tumors in the pelvis or abdominal cavity. The most careful examination is often required to ascertain the nature and source of the lesion giving rise to these symptoms. *Nephritic colic*, or paroxysms of pain in the loins, shooting along the ureters to the testicles and inside the thighs, with faintness, nausea, or vomiting, suggests concretions in the kidney when the urine is voided with undue frequency, often with pain at the end of the penis, mixed with blood.

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* All the necessary apparatus for such urine examination, arranged in a suitable stand by Mr. Payne for Dr. William Roberts, of Manchester, may be got of the firm of Mottershead & Co., Market Place, Manchester.

Suppression of urine suggests—(1.) Inflammation, hyperæmia, or structural alteration of the kidneys; (2.) Lesions in the course of continued or exanthematous fevers and cholera; (3.) Organic lesions of the brain, spinal marrow, or membranes. It is a most dangerous symptom—to be followed in a short time (if the secretion of urine does not return) by such alterations in the blood as denote extreme excrementitious plethora, effusion of fluid into shut cavities and areolar tissue, coma, and death. *Enuresis*, or inability to retain the urine, suggests over-distension of a paralysed bladder. Frequent micturition suggests inflammatory diseases of the urinary organs, and especially the bladder; also Bright's disease, or diabetes; also mental excitement and hysteria. An abundant flow of pale, limpid urine negatives the idea of acute or febrile disease. (See preliminary section in *Science and Practice of Medicine*, vol. ii., on diagnosis of kidney diseases and examination of urine.)

Examination of the kidneys and bladder is to be made by percussion, to determine enlargement of the former and distension of the latter.

Increased area of dulness on percussion, and fulness in the region between lower ribs and margin of ileum, especially when the parts are pressed forward against the thumb anteriorly, indicate tumor. A dull sound on percussion immediately over the pubis indicates fulness of the bladder, and, combined with pain, over-distension. Pain behind or below the pubis suggests inflammation or ulceration of the bladder or its cervix, or the existence of stone.

The *prostate* requires to be examined *per rectum.*

In the female, diseases must invariably be studied by the light of *menstruation.* Its monthly regularity must be inquired into; also, as to the usual amount of the discharge and its quality, and if there be much pain during the flow. If pain has been long continued, and if there is at the same time an increased flow from the vagina, with a purulent, white, or bloody character of the discharge, it will then be necessary to make an examination by the finger as to the condition of the *os* and *cervix uteri*, and, if necessary, with the speculum. The condition of the uterus, ovaries, and vagina must be thus determined, and generally accurate internal examination is necessary for diagnosis. It is an examination, however, which ought not to be had recourse to in the case of unmarried women, unless they cannot be cured without such an examination.

The question of pregnancy, and of uterine, pelvic, or ovarian tumors and diseases, requires a very careful and painstaking inquiry for efficient diagnosis. Pain in the back, difficulties in walking, or in defecation, are to be inquired into; and, lastly, the functions, condition, and appearance of the mammary glands.

III.—Diagnosis.

From the whole evidence and history of the patient, thus carefully committed to writing, and *all* the circumstances being fully known, the physician makes up his mind as to the nature of the case before him. He must convert the symptoms into signs of disease, or explain them as consistent with health. In other words, he must make a *diagnosis*—*i. e.*, he must know the disease throughout, and discriminate it from all others. His primary object is to aim at a *correct* diagnosis. This is absolutely necessary, in order that a rational mode of treatment may be devised, and a satisfactory prognosis arrived at, as to the probable result of the disease—in recovery, in permanent organic mischief to some organ, in chronic ill-health, or in death.

By such a careful examination of the patient as has been described, which elicits the facts as to his condition, the physician can at once determine—(1.) whether or not disease or ailment exists at all; whether the patient is, consciously or unconsciously, deceiving himself, or trying to deceive others; whether, in fact, he is a "malingerer," or is the subject of delusions, hysteria, hypochondriasis. "*Malingering*," as a type of deception, is markedly disappearing from communities where it has hitherto been supposed to prevail (the army, navy, poor-houses, and gaols), since the greater and extended use of delicate instruments, and methods of explaining and determining the existence of symptoms with greater precision.

(2.) From the examination conducted as described, the symptoms of any ailment the patient may have are sure to be discovered, and the next step is to appreciate the significance of the symptoms, and their relations to each other. Are the symptoms the signs of acute disease, of general disease affecting the whole system, or disease localised in one or more special organs, or of chronic disease? The preliminary survey of the case ought to determine these questions almost at a glance; and when the examination has been fully and carefully made, the kind of acute disease may be indicated also. Thus, increase of temperature, a quickened pulse, and respiration are certain indications of fever—either of specific disease or inflammatory; if combined with pains in the chest, cough and expectoration exist, with the signs also of pyrexia, acute thoracic disease is at once diagnosed; a *decubitus* on the back (supine), with symptoms of nervous prostration, muscular debility, and flaccid outstretched limbs, with dusky-brown tint of the skin, a stupid, lethargic, dull condition as to intelligence, indicates an acute specific fever—typhus, if its characteristic eruption is present. A warm, soft, and moist skin, with an acid smell, and a temperature above 100° Fahr. denote an acute rheumatic fever. Complexity of lesion and functional impairment are generally associated with chronic disease; and in such cases it is necessary to determine how far the patient is removed from the state of health usual to him, or how much more impaired his health has become.

(3.) The diagnosis is also to be made as between structural or organic disease and impairment of function, as well as the nature of the structural change and extent of the damage to the organ and its functions. In every individual case (either acute or chronic) it is necessary to consider the respective value of each morbid sign in connection with one another. The previous history of the patient, and the whole series of symptoms as to the duration, cause, and mode of invasions of the present illness must be carefully analysed; and even indirect manifestations of disease furnish valuable circumstantial evidence when subjected to careful reasoning and reflection. A summary of the objective symptoms of functional and structural lesions should be stated in the diagnosis of every case, arranged in the order of probable succession and importance—the main facts, which are obviously the most direct signs of disease, being first laid hold of. Each part of the testimony as to the progress and duration of symptoms—the termination of the case and the results of treatment—should have its proper position assigned to it, as elements in determining the diagnosis; and to do this, *all* the facts must be carefully sifted and weighed, and not indiscriminately collected or heaped together. It is in the endeavour to effect such a summary that a minute acquaintance with anatomy, physiology, pathology, and the natural history or biography of disease is of so much value to the student; and if to such knowledge he also possesses the powers of a good reasoner, with a varied extent of collateral knowledge and acquirements, these will greatly contribute towards that completeness and accuracy of diagnosis which distinguish the accomplished physician who thoroughly knows and practises his art. It is by such processes of analysis that a *direct diagnosis* is made—and this with greater or less difficulty in different cases. Taken individually, very many symptoms are common to many diseases; but when several symptoms constantly occur, singly, or in groups together, or in uniform succession, they point to definite diseases, and become certain signs of such diseases. These symptoms, which are peculiar and distinctive, ought to be well known, so as to be appreciated with rapidity. They are the "*pathognomonic symptoms*" of disease—so called because of the certainty with which they indicate the particular disease, and so clench the diagnosis—*e.g.*, the appearance of the peculiar eruptions in small-pox, scarlet fever, typhus, and enteric fevers respectively, superadded to the febrile phenomena common to them all.

A *differential diagnosis* is made when cognisance is taken of the essential signs by which one disease can be discriminated or differentiated from another which it resembles.

The co-existence, also, of several diseases in the same person is not to be overlooked in diagnosis, inasmuch as the direct symptoms of each separate lesion may be modified or neutralised by one another.

Time for the development of symptoms is also an important element in diagnosis. The early manifestations of many disorders are so similar (as in fevers), that it is impossible to tell with which of several maladies we may have to deal, till after a few days some other element develops itself, which solves the doubt.

Varieties of disease require also to be identified and considered in differential diagnosis. A complete diagnosis does not limit itself to the determination of such primary ailments as may have led the patient to seek for medical advice. The state of all his organs and functions must be so completely determined as to enable the physician to say whether or not any organic disease exists in any part or function of the body, and so make an *entire* and complete diagnosis of the patient's case.

A diagnosis may also be arrived at by the process of *exclusion*—that is, by finding out what the disease is not; but if it is necessary to use this method of diagnosis, it shews that the case must be unusually difficult and obscure.

A speedy and rapid diagnosis is often demanded—as at the bedside in private practice. In such circumstances the main facts of the case are first elicited, especially those which are the most direct signs of disease. The mind, working almost unconsciously, decides as to what part or organ is thus indicated as the seat of the malady; and this having been carefully examined, with knowledge and experience, a direct and differential diagnosis is thus almost intuitively arrived at. If no signs of local disease exist—only those of general or constitutional disturbance, as in fevers—clinical experience and knowledge of such diseases are then required to decide the nature of the case.

It is the co-existence of many lesions which makes diagnosis difficult, and the pathological relations subsisting amongst them—as is the case with the numerous local lesions and intercurrent morbid phenomena arising during a case of Bright's disease, or idiopathic fevers; and diagnosis is also especially difficult in cases of acute disease supervening in chronic affections.

The absence of any particular symptom which usually exists in a particular disease ought to be specially noted, to shew that its omission is not due to negligence or forgetfulness on the part of the observer.

IV.—Prognosis.

A correct and complete diagnosis implies also the forecasting of events, and the formation of a just estimate of the probable result of the illness or disease. To do this requires experience and knowledge of the natural history of diseases, combined with caution and tact, when the physician is said to make or to give *a prognosis.* He has then to determine—(1.) As to whether the illness will terminate in the death or recovery of the patient? (2.) If the patient lives, whether recovery will be complete, or whether permanent organic mischief of greater or less extent will remain? (3.) Whether persistent impairment of the general health will result (*cachexia*)? (4.) What will be the probable duration of the illness? (5.) If death is the probable result, how will it likely come about? Is it likely to be slow or sudden? attended with pain or not? with convulsions or not? with consciousness or unconsciousness? (6.) Whether certain symptoms, apparently trivial in themselves, are or are not indications of danger, or of serious disease, such as slight convulsive movements, numbness—"*pins and needles*"—suggestive of cerebral disease? (7.) Whether any complications may come on likely to increase the danger, or sequelæ of disease remain? Patients or their friends are ever ready to put any one or all of such questions to the physician. With certain knowledge and experience, positive opinions may be expressed without hesitation. If doubt exists, let the patient and his friends have the benefit of the doubt, by explaining to them the exact nature of the disease and of the doubt. The stimulus of hope is of great value in favouring the return to health; and with all the growing resources of our art, prognosis should be as cheerful and favourable as possible. Unduly or prematurely hopeless prognosis is a violation of the first duty of the physician. (*Lancet*, March 13, 1869.) If the prognosis is generally unfavourable, it is better to communicate this in the first instance to one judicious friend solely, rather than to the patient; and the dangers of the case ought always to be clearly explained. If an opinion is asked by the sufferer himself in cases where there is *no* hope, it becomes our duty to tell him so.

The elements on which a prognosis must be based are as follow:—A complete and intimate acquaintance with the natural history of each disease, especially as to (*a*.) its known rate of mortality. For example, the prognosis in *relapsing fever* is more favourable than in *typhus fever*, because the rate of mortality in the former is only 2 or 3 per cent., whereas in typhus fever it is as high as 20 per cent. (*b*.) The special circumstances known to influence the rate of mortality—namely, age, constitution, habits of the patient, and stage of the disease. (*c*.) The appearance of certain symptoms of hyperpyrexia or complications, which add to the severity or danger of the original disease.

Much knowledge has still to be acquired on the subject of Prognosis. As applied to determine the eligibility of lives for insurance, the question of prognosis is a very important one—especially as affecting the calculations of the individual chances of longevity. For life insurance purposes, a due consideration requires to be given to every circumstance of family and personal medical history; and such a careful examination of every organ and system, as that which has been described, is necessary to furnish data on which to decide the eligibility of individuals for life assurance, combined with an extensive knowledge of the natural history of diseases.

V.—Treatment.

The principles according to which the management of a case is to be conducted, and the particular indications for Treatment, must be given in detail—embracing also special directions as to diet and regimen.

Copies of the prescriptions ordered are also to be recorded.

The treatment of a case implies the prevention or further extension of disease (prophylaxis), as well as the alleviation or cure of the existing ailment.

The food, drink, and administration of alcohol; the temperature of the sick-room and its ventilation; the dryness or moisture of its atmosphere; the use of baths, hot or cold; the use of electric or galvanic appliances; the nursing and general management of the patient;—all require to be prescribed for, and personally attended to by the physician, with the same care as the medicinal agents of the pharmacopœia; and each detail of management ought to be in accordance with the best and most approved theories respecting diseases and their remedies, as well as with physiological and pathological knowledge.

In prescribing remedies, the individuality of the patient must be carefully considered, not less than the nature of the disease. The points essential to the individual, and which must influence the prescription of remedies, are—the age of the patient, the habits of life, as to alcohol especially, the general strength of the patient's constitution, the stability of the nerve centres, the muscular power of the heart, the contractile resistance of the arteries, and the specific nature of the cause of the disease.

Every phase in the natural course and progress of the disease must be foreseen and provided for, implying a full knowledge of its nature, seat, and stage. The known tendencies of the disease to a fatal termination ought to be guarded against, especially as regards failure of the heart's action, systemic death by decline of aortic pressure, rapid as in syncope, or gradual and prolonged as in disease of days, weeks, or months' duration; the state of the chief organs and functions of the body, especially the heart, lungs, and kidneys, must be specially investigated, with reference to medicines and the management of the case, or impairment of the nervous centres or of the lungs.

VI.—Progress of the Case.

The patient is to be visited and re-examined at intervals, varying as regards time, according to the gravity of the case, and the rapidity with which it progresses from one stage to another in its natural course. In thus noting the progress of the case from day to day, the same plan of examination in regions and systems is to be followed out as here recommended for the first examination of the case.

Its continuous history naturally divides itself into two parts:—(1.) The accounts given by the patient of his own condition from day to day, and those given by his friends, attendant, or nurse; (2.) The phenomena actually observed at the bedside by the physician. Any changes in the patient's state, or new phenomena, are to be specially looked out for and inquired into at the time. In fever cases, daily records of temperature ought to be made as often as may be considered necessary—twice or thrice daily, at least—and all observations ought to be accurately recorded at the time, while the facts are fresh in the mind. The morbid phenomena, of which a summary is given under *diagnosis*, must be especially noted.

The state of the tongue, as to depth of colour, dryness, contraction, and diminution of the fur or coating, ought to be closely observed and recorded from day to day. The pulse and number of respirations are also of daily importance.

The successive daily evacuations from the bowels and the kidneys from day to day, ought always to be preserved in suitable vessels by the nurse or attendants for inspection by the physician. The urine for the whole twenty-four hours is to be preserved separate from the fæcal evacuations, and its amount measured and recorded daily. The effect of remedies must be especially inquired into—*after* having ascertained whether the medicine, diet, and instructions prescribed have been actually administered and followed out.

VII.—Termination of the Case.

The date and nature of the result is to be carefully noted; having special reference to the questions summarised under the head of *Prognosis*—giving an account of the patient's condition when he ceases to require medical care. The influence the disease may have had on the state of the different functions should be indicated. If the case prove fatal, and a *post-mortem* examination is made, a record of the lesions or stamps of disease seen after death ought to be preserved—every organ in every cavity of the body being carefully examined, after the best methods of conducting investigations in morbid anatomy. When this is complete, an abridged summary of the whole case should then be made in the most concise language, stating as near as possible the phenomena in the order of sequence, with the combined light of the history of the case during life and appearances after death.

The Province of Morbid Anatomy is to detect the "*stamps*" or "*anatomical signs*" of disease in the structures, tissues, or organs of the body, their exact anatomical connections and relation to the course of the disease.

By such careful observation of cases, the Science of Pathology and of Practical Medicine is advanced. It has for its object the investigation and elucidation of the nature, origin, course, and causes of these anatomical changes, by the combined aid of clinical observation during life, and the dissection of the body after death. Thus it seeks to establish the relation of the changes leading to the lesions, and connects the progress of diseased action with symptoms and signs. (See *Science and Practice of Medicine*, chaps. vi., vii., and viii., for the constituent elements of diseases and of lesions.)

CHAPTER III.

SUMMARY OF COMPLEX MORBID PROCESSES CONSTITUTING LOCAL LESIONS.

The following are the more complex forms of Morbid Processes which the College of Physicians have recognised as constituting local lesions or local diseases:—

(1.) Catarrh.

(2.) Inflammation, comprehending the forms known as ulcerative, suppurative, plastic, rheumatic, gouty, pyæmic, syphilitic, scrofulous, gonorrhœal.

(3.) Gangrene.

(4.) Passive congestion.

(5.) Extravasation of blood, or hæmorrhage.

(6.) Dropsy.

(7.) Fibrinous deposits.

(8.) Alteration of dimensions by dilatation, contraction, hypertrophy, or atrophy.

(9.) Degenerations, such as fatty degeneration, mineral degeneration, or petrifactions (which last two are the components of atheroma, and so called ossification), pigment degeneration, sometimes called pigmentation, fibroid degeneration.

(10.) Lardaceous disease, which has sometimes been called albuminoid degeneration, waxy, or amyloid disease.

(11.) Tumors, classified into malignant and non-malignant.

(12.) Cyst, cyst formation, or cystic disease.

(13.) Parasitic disease.

(14.) Calculus and concretions.

(15.) Malformation.

(16.) Functional diseases.

(17.) Another complex morbid process, which plays an important part in the course of many diseases, may be added to these. This morbid process is indicated by an increase of temperature of the body above the normal of 98° Fahr., and to this condition the name of *Fever* or *Pyrexia* has been given. Here the lesion is in the blood.

CHAPTER IV.

DESCRIPTIVE OUTLINE OF EACH OF THE ELEMENTARY MORBID CONDITIONS WHICH CONSTITUTE LOCAL LESIONS.

(1.)—Catarrh.

This lesion or local condition is regarded by some as a variety of inflammation of mucous membrane. It is recognised by hyperæmia, tending to engorgement of the blood-vessels of any region of the mucous membrane; by an abnormal secretion of fluid, oozing out, or freely flowing from the glands of the mucous surface; and by a succulent and swollen condition of the surface. A copious generation of young mucous cells occurs (*proliferation*), which push their way to the surface, and so cause the catarrh or flux. The regions of the mucous tract most prone to catarrh give regional names to the catarrhal disease—*e.g.*, acute or chronic bronchial catarrh, virulent or non-virulent catarrh of the urethra, uterine catarrh, vaginal catarrh, and so on. (See *Science and Practice of Medicine*, chap. viii.)

(2.)—Inflammation.

This very complex morbid process is characterised by and comprehends the following phenomena, namely:—

(1.) A suspension of the concurrent exercise of functions among the minute histological elements of the tissues involved.

(2.) Changes in the blood-vessels and circulation of blood in the part, consisting of (*a.*) Stagnation of the blood, and abnormal adhesiveness of the blood discs in the capillary vessels, contiguous to the tissue elements, whose functions are suspended; (*b.*) Contraction of the minute arteries leading to the capillaries of the affected part, with subsequent paralysis and dilatation of the contractile tissue of the affected blood-vessels.

(3.) Exudation of *liquor sanguinis*, and transudation or permeation of the walls of the blood-vessels of the inflamed part by the white blood corpuscles (*leucocytes*), without rupture of the blood-vessels, into the surrounding textures.

(4.) Altered nutrition of the inflamed tissue, so that the nutritive changes between the blood in the vessels and the minute component elements of the affected tissue become visibly altered, and eventually an appreciably excessive interstitial exudation infiltrates the affected tissue, with a constant tendency to a profusion of germinal, molecular, and cell growth, to which this interstitial exudation ministers abundant nutrition.

This excessive exudation, which follows as a result of the continued existence of the inflammatory state, is apt to be associated with an unhealthy condition of the blood, and hence some of the varied forms of inflammation which have been named, and in which the superabundance of new germinal growth (*proliferation*) assumes also various forms, according to—(1.) The elementary histological constituents of tissue in which the inflammation takes place (*e. g.*, mucous membrane, serous membrane, cornea, iris, skin, and bone); (2.) The specific, constitutional, or local disease with which the inflammation co-exists (*e. g.*, rheumatism, gout, syphilis, specific fevers); (3.) The progress of the inflammation, the amount and suddenness of the exudation process, the extent of the tissue involved, the diminished vascularity, and the powers of absorption of the surrounding parts.

Thus the process of inflammation is a very complex one, in which many stages of morbid action are passed through; and (as has been learned from observing the process in the transparent parts of animals) the series of complex changes which the inflammatory process embraces, although they have been stated here consecutively, yet they cannot be traced in every instance in distinct succession, but are, on the contrary, as nearly as possible *concurrent*, rather than a distinct *series of events.* But in so far as a series of events in constant sequence has been seen, that sequence is, in the order stated, one of the most important results of the existence of inflammation—is the material change that occurs in conditions for healthy nutrition of the affected part; and for details regarding these altered conditions, the reader is referred to the *Science and Practice of Medicine*, by the Author, p. 26, vol. i., especially as to how the supply of blood to the part is altered, and the consequences arising therefrom; how the constitution of the blood is altered as regards its adaptability to nourish the part, the appearances of the blood in inflammation, the so-called *buffy*-coat, and the kind of diseases in which this buffy-coat is increased.

The different phenomena of the complex process of inflammation, when clearly understood, are capable of elucidating the nature of the more obvious symptoms of this lesion, and to some extent the phenomena physically account for the symptoms, especially as to redness, pain, heat, and swelling. (See *Science and Practice of Medicine*, by the Author, p. 27, vol. i.)

"*Determination of blood to a part*" requires to be distinguished from "*passive congestion.*" The former is characterised by dilatation of the arteries, with increased flow of blood through the capillaries; whereas *passive congestion* is characterised by the accumulation and stagnation alike of red and white corpuscles in the vessels. These tend to be abnormally adherent to each other and to the vessels; and the condition is always associated with low vital activity of function. Mere determination of blood to a part is apt to disappear *post-mortem;* passive congestion, on the other hand, is persistent, and remains *post-mortem*, as the most important, if not the only sign of the early stage of inflammation. It is obvious on dissection by the intense redness, due to red blood-discs adhering to each other in the more minute ramifications of the blood-vessels, and not merely to distension of larger vessels.

The capillary vessels, from the nature of their structure as a delicate, homogeneous, yielding, and contractile protoplasm, allow of the permeation of blood corpuscles through their walls, and so modify very much the nature of the exuded material in the different foci of inflammation. Sometimes the morbid change or lesion in a part characteristic of inflammation may be so slight as to be limited in its visible results to the elementary textural components of the tissue, without any other appreciable exudation amongst the interstices of tissue or free surface of a membrane. Such a condition has been named *parenchymatous inflammation.* For examples of this, see *Science and Practice of Medicine*, p. 37.

The results of inflammation may be—

(1.) "Resolution," when the abnormal action ceases, hyperæmia subsides, interstitial exudation is at an end, impaired function is repaired, and the part is completely restored to its healthy condition, after the absorption of the material produced during the inflammatory process.

(2.) Productive effects of inflammation, in the form of inflammatory effusions, exudations or exudates, consisting mainly of (*a.*) Serum, or *liquor sanguinis;* (*b.*) Blood; (*c.*) Fibrine; (*d.*) Mucin.

The effusion of pure serum is rare; and in the inflammation of a serous membrane, the fluid effused is not only greater in quantity than is normal to the part, but it is also greatly altered in quality. Normally the serous secretion is little more than pure aqueous vapour, with a little saline material in solution; but when exudation of *liquor sanguinis* occurs in inflammation of a serous membrane, it is associated with the passage of blood corpuscles through the walls of the capillaries, and contains a considerable quantity of albumen and of fibrine, the amount of both of which increases with the intensity of the inflammation; and there is also an excess of phosphates and carbonates. The quantity of serum effused in inflammation may vary from a portion of an ounce to many pints or even gallons.

The blood plasma contains two albuminous compounds, namely, *paraglobulin* and *fibrinogen;* the former exists alone in the serum in considerable quantity; the latter exists alone in liquids effused into *inflamed* serous cavities in very small quantity. These are the so-called *fibrine-factors*, inasmuch as in every act of coagulation *fibrine* seems to be produced by the combination of these two closely allied albuminous substances. The colourless elements of the blood are the chief agents of coagulation.

Examples of serous exudations are seen in the fluid of blisters, of peritonitis, pleurisy, pericarditis; the fluid in the vesicles of herpes and eczema; the fluid which surrounds deep inflammation in connective tissue and the first stage of pelvic cellulitis; and the fluid of a hydrocele. The fibrine contained in serous effusions remains in solution so long as the fluid remains at the temperature of the body, and in its place of formation during life; but coagulates readily when withdrawn from the living body, or after death. This fluid condition thus favours absorption, when resolution or recovery begins, and the function of absorption is restored, which is always in abeyance in and about an inflamed part.

Effusion of *liquor sanguinis* from mechanical obstruction to the flow of blood, as the fluids of anasarca and ascites, does not coagulate, and so differs from the fibrinous effusion of inflammation.

Inflammatory effusions possess other characteristics,—namely (1.) A larger proportion of certain ingredients than are found in the normal blood, especially an excess of chloride of sodium, phosphates, and albumen. (2.) Material in which organic forms (bioplasms) find ample sources of nutrition, especially proliferation of the existing elements of tissue and migrated blood corpuscles.

On the site of effusion, causing special sources of danger, and on the quantity of effusion varying with the structure of textures, also as to blood effusions or extravasations, and their significance in inflammations, see *Science and Practice of Medicine*, by the Author, p. 41, vol. i.

The results of inflammation are also seen in the varied characters of the new growths in the "inflammatory lymph;" for example, the so-called "adhesive or lymphy inflammation" contains a preponderance of fibrillated material, mingled with granules and molecules; whereas in "suppurative" inflammation the cell elements predominate.

For an account of the typical forms of growth in lymph, its absorption and degeneration, see *Science and Practice of Medicine*, by the Author, p. 43-45.

The specific weight of all inflamed parts is increased in proportion to the amount of new material, its abundance of albumen, and saline ingredients.

The local symptoms of inflammation are—An increased flow (determination) of blood to the part, generally causing *redness;* also *swelling* of the part, *pain*, *throbbing*, *increase of sensibility*, *disorder of function*, *arrest and subsequent alteration of the characters and constituents of secretion*, and local increase of temperature. These symptoms ought to be recognised and analysed by the student into *objective* and *subjective.*

The general or constitutional symptoms of inflammation are especially *Fever*, to which the names of *inflammatory*, *symptomatic*, or *sympathetic fever* have been given; for an account of which, see *Science and Practice of Medicine*, p. 48–51. vol. i.; also, these Outlines, under "Fever."

The immediate cause of an inflammation is due to the action of any irritant operating with varying degrees of severity, from the mildest irritation up to anything short of destruction of life, in the textures of the part. When the action is so mild that function is impaired for a time only, that impairment will gradually subside as soon as the irritant action is removed, and the tissues gradually will return to their normal state of functional activity. This is technically called "Resolution" of the inflammation.

The causes of inflammation are also—(1.) Determining or exciting. (2.) Predisposing causes or influences.

(1.) *The immediately determining or exciting causes* are embraced in such things as may be described by the expression of "*an irritating stimulus*"—*irritation* of some kind being the starting point in every form of inflammation. See *Science and Practice of Medicine*, p. 53.

(2.) *The predisposing causes of inflammation* are such influences as cooperate with the determining causes—such influences as make one man more apt than another at the same time to initiate an inflammatory disease, or special forms or varieties of inflammation, impairment of general health—(*cachexia*); also plethora, from excess of food or alcoholic drinks; the existence of specific disease-poisons affecting the blood, such as eruptive fevers, rheumatism, gout, or syphilis; and more especially when elimination of the products resulting from metamorphoses of tissue is arrested, and there is deficient excretion by kidneys, skin, or intestines.

The Varieties of Inflammation named by the College of Physicians are as follow:—

(*a.*) *Ulcerative inflammation*—a form in which the inflammation process eventually makes its way to a cutaneous, mucous, or internal surface of a tubular vessel, and there induces a breaking up or loosening of the textural elements of that surface, and the formation of what is called an *ulcer.* Suppuration or pus formation is established on this broken surface, and what are called *granulations* appear. The term *ulceration* is now used to express the removal of the superficial or exposed particles of inflamed parts; but when the epithelium only, or epidermis of a part, is alone removed, and none of the vascular or proper tissue beneath it, the lesion is called an "abrasion" or "excoriation." See *Science and Practice of Medicine*, p. 54, for a more detailed account of ulceration and granulation.

(*b.*) *Suppurative inflammation* is a form which results especially in the formation of pus, by the growth of pus cells—one of the most frequent and important results of inflammation. See *Science and Practice of Medicine*, for an account of pus formation and the pus cells, p. 57.

The formation of pus is termed "suppuration," which may be circumscribed, diffused, superficial, or deep. Perfect pus—good healthy, praiseworthy pus—the *pus laudabile*—pus to be commended as perfectly elaborated and well-formed, is a smooth, viscid, yellowish, or cream-coloured fluid, specifically heavier than water, averaging generally about 1·030, having little or no smell, and of an alkaline re-action. Microscopically, it contains the pus cell as its principal constituent, and often also minute clear particles (not more than $\frac{1}{10000}$ of an inch), presumed to have some relation to the pus cell as rudiments or nuclei of them. These constituents float in a fluid or serum called the *liquor puris*, which closely resembles *liquor sanguinis.* The pus cells are about $\frac{1}{2500}$ to $\frac{1}{3000}$ of an inch in diameter, pellucid, filled with semi-fluid albuminous contents; and when they contain a few minute oil globules, as they do sometimes, the pus cells have a granular appearance. The pus corpuscle cannot be distinguished from the white corpuscles of the blood, or *leucocytes*—a term now used to include all masses of contractile protoplasm, such as pus, lymph, or white-blood cells, each of which is endowed with the power of spontaneous movement, and capable of undergoing continuous alterations of form (amœboid), and which may migrate into the tissues, and there multiply by division.

The shape of the pus corpuscles depends upon the density of the *liquor puris.* Sometimes a distinct, circular, dark-edged nucleus may be seen in the paler corpuscles, and sometimes two or even three particles, like a divided—bi- or tri-partite—nucleus.

Circumscribed formation or accumulation of pus is called an "*abscess*":

and a *boil* or *phlegnon* is an abscess or collection of pus enclosing generally also a portion of dead tissue (slough) in its interior.

Diffuse suppuration implies infiltration of pus amongst the textures interstitially, as in *phlegmonous erysipelas.*

Superficial suppuration occurs generally in mucous or cutaneous surfaces,—*e.g.*, Gonorrhœa, purulent ophthalmia.

Pus formation may be seen to proceed either (1.) from the germs of superficial tissue, such as the free growing nuclei of epithelium; (2.) from the germs or bioplasm of connective tissue.

Two elementary distinct forms of inflammation are to be recognised, namely, (1.) *Parenchymatous*, where the process begins and runs its course in the interior of the minute tissue elements—in bioplastic material, such as growing or germinal elements of connective tissue, hepatic or renal cells and cartilage. (2.) *Secretory or exudative inflammation*, as in superficial and interstitial tissue elements, amongst which the inflammatory fluid accumulates and tends to the surface (mucous or cutaneous), carrying with it the various products of the inflammatory state. (See *Science and Practice of Medicine*, p. 60.)

Certain events are especially apt to accompany or follow inflammation—namely, *softening*, *interstitial absorption*, *indurations*, *ulceration*, *mortification.*

Softening, indicated by diminished cohesion of tissue, is an almost constant result. In some parts, such as the brain, this softening reduces the tissue almost to a fluid pulp.

Interstitial absorption gradually precedes the extension of inflammation, as in the case where an abscess is said to "point," where, inflammation continuing, the formation of pus moves along in a definite direction towards the cutaneous or mucous surfaces of the body.

Induration occurs chiefly in chronic inflammation, affecting fibrous tissues.

When suppuration continues beyond the powers of the constitution to supply the material of lymph and pus, a characteristic type of febrile symptoms is apt to supervene—namely, Hectic Fever—a form of fever which is apt to arise from any condition besides suppuration which drains the system of material, such as the continued secretions of the mammary gland in mothers who suckle their infants beyond the natural period.

The type of hectic fever is to be distinguished from inflammatory fever and typhoid symptoms, by its remarkable intermissions—usually periodical—remission and exacerbation occurring once or twice in the twenty-four hours. There is also excessive wasting of the body (emaciation), and the sweating which attends the paroxysms of the fever (colliquative sweating) greatly increases the exhaustion of the powers of life. This sweating is sometimes accompanied with or replaced by diarrhœa; and the ranges of temperature (for which see *Science and Practice of Medicine*) are characteristic.

(*c.*) *Plastic inflammation* is said to exist when the new material of the process not only tends to solidify, as fibrine, but is also loaded with elementary colourless corpuscles. It is a form of inflammation for the most part peculiar to serous surfaces, to the cut surfaces of wounds, and the flaps of amputated parts. The new material is known by the name of "lymph." It is capable of growing and of being moulded into form, and hence it is described as "plastic." Its tendency is to glue together opposed surfaces over which it may form, by the union of elementary parts; and the new material becomes organised by the formation of blood-vessels, which contributes to the nutrition of the uniting texture. For an account of the details of the process of the new growth, see *Science and Practice of Medicine*, vol. i., p. 65.

(*d.*) *Rheumatic inflammation* is that form which occurs during an attack of acute rheumatism, or in a person liable to such attacks, when certain textures are especially prone to suffer—namely, the fibrous tissues of joints, aponeurosis of muscles, sheathes of tendons, neurilemma, periosteum, sarcolemma, and tendons. (*Science and Practice of Medicine*, p. 66.)

(*e.*) *Gouty inflammation* is that form which occurs during an attack of acute gout, or in a person liable to such attacks. It is characterised especially by the intensity of the pain, a clear shining surface of the distended skin, œdema of the parts below, and final desquamation of the cuticle. In these respects it differs from rheumatic inflammation. (See *Science and Practice of Medicine*, p. 67.)

(*f.*) *Gonorrhœal inflammation* is a form of superficial or secretory inflammation of the mucous membrane of the urethra, arising about five days after the direct contagion of gonorrhœal pus within the orifice of the urethra.

Besides these forms of inflammation specified in the nomenclature of the College of Physicians, there is yet a large number of diseases specifically distinct as to their cause, symptoms, and progress, which are linked together by the common occurrence of inflammation; and in proportion as our knowledge of the causation of inflammation extends, so may we disentangle from the yet "unassorted heap of inflammations" many varieties of this elementary form of disease hitherto undistinguished.

(3.)—GANGRENE.

This lesion is an incomplete mortification or death of a portion of an organ (which is rare), or of soft tissue (which is common), while the rest remains alive. When the part is completely dead, the condition is termed *sphacelus.* The terms *caries* and *necrosis*, as applied to dense tissue like bone, are analogous terms: *caries* being *gangrene* or incomplete death of bony tissue, while *necrosis* is a *sphacelus* or completely dead portion. Particular names are also given to dead parts—*e.g.*, "necræmia" means death of the blood; "slough" means a dead piece of tissue; "sequestrum" is a dead piece of bone. Progressive gangrene of soft parts is usually called "sloughing." (*Science and Practice of Medicine*, p. 68.)

It is necessary to distinguish gangrene or mortification from degeneration. A degenerate part never becomes putrid; and no process ensues for its isolation or separation. The degenerate part remains in continuity with the surrounding parts, if it is not absorbed.

(4.)—PASSIVE CONGESTION.

This condition implies over-fulness of blood in the capillary vessels of a part, generally associated with impairment of the vital relations between the blood and minute elements of texture, as favouring the sluggish flow of blood. Two forms of congestion are to be specially recognised—namely, *active* and *passive.* The former cannot be separated from inflammation in a texture, and has been noticed under inflammation, as it is part of that morbid process when too much blood passes into an inflamed part by the arteries, as determination of blood. On the other hand, passive congestion is established when too little blood passes out of the part in proportion to what passes into it. The circulation is extremely languid through the capillaries; and it implies a weak condition, with feeble circulation, deficient power of nutrition, and a low tone of the system, tending to atrophy and degenerative changes. For an account of the causes of this form of congestion, see *Science and Practice of Medicine*, vol. i., p. 71.

(5.)—EXTRAVASATION OF BLOOD—HÆMORRHAGE.

This form of disease consists in a discharge, transudation, or effusion of blood (in its entirety) from blood-vessels along which it ought to flow; and it may be spontaneous or traumatic. The escape of blood from the vessels may be by rupture of the vessel from disease or injury; but exhalation of blood, or "sweating of blood," through the capillaries may also occur—as Cohnheim, Waller, and Addison have shewn, without any rupture or visible breach of surface.

Other causes of hæmorrhage are congestions due to mechanical agency; and when the hæmorrhage takes place into the substance of an organ, the lesion receives the name of "*apoplexy*," or "extravasation."

Hæmorrhages are active or passive. Spontaneous hæmorrhages, such as menstruation, are active; but those hæmorrhages are considered passive which result from external injury of the vessels, or from some general cause of disease (systemic or constitutional), which injures the vessels, or contaminates the blood. Some morbid poisons tend to this result, such as those of typhus fever and small-pox. For an explanation of other causes of special hæmorrhages, see *Science and Practice of Medicine*, vol. i., p. 76.

Secondary hæmorrhages are said to occur in inflammation, when blood is effused from rupture of the newly-formed vessels in the inflammatory products. Examples of such forms of hæmorrhage are given in *Science and Practice of Medicine*, vol. i., p. 76.

A *hæmorrhagic diathesis* implies a disposition or liability to habitual bleeding, occurring in some persons as a constitutional peculiarity. The tendency is generally congenital; but it may also become developed afterwards as life advances.

The names of special hæmorrhages are—*epistaxis*, or bleeding from the nose; *hæmoptysis*, or bleeding from the air-tubes or air-vesicles; *hæmatemesis*, or bleeding from the stomach; *hæmaturia*, or bleeding from the urinary passages; *melœna*, or bleeding from the intestines; *menorrhagia*, bleeding from the female genital passages. A statement of the consequences of these hæmorrhages, with their prognosis and treatment, is to be found in the larger work on the *Science and Practice of Medicine*, by the Author.

(6.)—DROPSY.

This name is a contraction for *Hydropsy*, and signifies the accumulation of a watery fluid, occurring independently of inflammation, in one or more of the serous cavities; or it is a diffusion of watery fluid through the areolar tissue of the body, or in its solid organs; or all these conditions may be combined. The fluid of dropsy differs from inflammatory fluid in the absence of all coagulating elements. The naming of the different dropsies is peculiar. That of a serous cavity is designated by the name of the cavity, combined with the prefix *hydro*—hence *hydro-thorax* and *hydro-pericardium*, for dropsy of the pleura and dropsy of the pericardium. Special names are also given to other forms of dropsy. Thus, dropsy of the *tunica vaginalis testis* is termed *hydrocele;* but this is generally a result of inflammation, and for that reason is regarded as a *spurious dropsy;* so also is that of the joints and bursæ. Limited to a part of the *areolar tissue*, or organ of the body, such as the lungs, the dropsy is termed *œdema;* and when it pervades generally the whole body, the dropsy receives the name of *anasarca*, when the fluid generally preponderates to the feet and legs, where venous stasis is most apt to occur, and circulation is the weakest. It tends also to preponderate to positions which are dependent when the recumbent posture is assumed, and in places where the connective tissue is loose, as in the prepuce, the scrotum, the region of the lower eyelids, and the substance of the lungs. *General dropsy* is that condition in which anasarca is combined with effusion into the serous cavities. All cysts enclosing fluid—themselves of morbid growth—are spurious forms of dropsy. There are ovarian cysts enclosing fluid, sometimes called "dropsy of the ovary;" and kidney cysts enclosing fluid, sometimes called "dropsy of the kidney."

Although not a substantive disease, yet, practically, the accumulation of fluid and the consequences it induces are the main objects of treatment. There are various symptoms caused by the fluid which are the main source of distress and danger to the patient, embarrassing to important functions, or even extinguishing life.

Two sets of symptoms must be analysed in every case of dropsy—

(1.) Those which belong to the primary disease.

(2.) Those which are due to the collection of fluid.

The dropsies referred to here are those known as passive dropsy, in contradistinction to inflammatory or active dropsy, and to other spurious forms of dropsy.

The forms of dropsy to be clinically recognised are—

(*a.*) *Acute or febrile dropsy*, most frequently arising from exposure to cold and wet; and eventually it generally becomes intimately connected with a disturbance of the renal function.

(*b.*) *Renal dropsy*, in which there is organic disease of the kidney. (See "Bright's disease.")

(*c.*) *Cardiac dropsy*, in which there is organic disease of the heart—obstructive to the free passage of venous blood (see "Diseases of the Heart"). It may also take its origin from certain lesions of the lungs.

(*d.*) *Dropsy due to disease of the liver*, causing obstruction to the circulation through the portal system.

(*e.*) *Dropsy due to the presence of tumors*, such as aneurism or cancerous growths, or the pregnant uterus, or ovarian disease pressing on the large veins of the thorax and abdomen, or coagula within these veins.

The symptoms, therefore, of the various forms of dropsy are to be inquired into (1.) with reference to these several forms of disease on which the dropsy depends; and (2.) as to the effects produced by the dropsical fluid. (See *Science and Practice of Medicine*, vol. i., pp. 81–84.)

(7.)—FIBRINOUS DEPOSITS.

Fibrinous deposits occur in a part when fibrine separates from the blood, and is deposited in various textures or organs.

Fibrine is now shewn to be an insoluble compound, produced by *globulin* of the blood corpuscles, combined with the *fibrinogen* of the *liquor sanguinis.* It is especially produced during the act of blood coagulation, and is a prominent element in thrombosis, endocarditis, and the contents of aneurisms. Recently precipitated fibrine is colourless, homogeneous, and transparent, and generally tumid, from imbibition. The precipitation of 2 parts of fibrine in 1,000 is sufficient to maintain a jelly-like consistence of coagulum. The molecules of fibrine at once begin to attract each other, and so to shrink as to squeeze out the fluid in its meshes, and thus the solid and liquid constituents of a clot of blood are separated. (See *Science and Practice of Medicine*, vol. i., p. 85.)

(8.)—ALTERATION OF DIMENSIONS.

Altered dimensions occur from hypertrophy, atrophy, dilatation, or contraction, and are important manifestations and results of disease. A distinction is to be made between hypertrophy and hyperplasia.

Hypertrophy and *hyperplasia* are both the result of increased nutrition. In the former—*hypertrophy*—the *amount* of tissue is increased, the result of an increase of functional activity. In the latter—or *hyperplasia*—there is an increase in the size of the elements of tissue of which the part is composed, combined with an increase in their number. The result of hypertrophy is to enlarge dimensions—as the muscles of the calf of the leg in dancers, the muscles of the arm in blacksmiths, of the heart in aortic and mitral regurgitation, of the bladder in stricture of the urethra,—so that generally it may be said that increased activity of function leads to increased development and bulk.

Atrophy is a result of impaired nutrition. The bulk of tissue is diminished, either by diminution of the size of the elements of tissue, or diminution of the number of histological elements composing the part. There is therefore loss of weight and impairment of functional activity.

Emaciation is an example of atrophy due to disappearance of fat from the adipose tissue. All the fluid organs are liable to such diminution of bulk by atrophy of their cell elements.

(9.)—DEGENERATIONS.

Degeneration is said to exist when any tissue or textural element of tissue is replaced by something else abnormal to the part. Microscopically, there appears to be a granular disintegration of the minute elements of the tissue; or there is such deterioration and impairment of function as an exudation, a deposit, or the loss of functional properties would bring about. It is a passive change, distinct from a living process.

A distinction is now required to be made between degeneration of parts and substantive diseases. The form which degenerations assume are—fatty, softening or rottenness of texture, calcification or petrifaction of tissue, pigmental degeneration, fibroid degeneration, and thickening from hyperplasia, altered consistence, and diminution of elasticity of the tissues, as in advanced life. All degenerations are of the nature of decay and death, and are examples of atrophy with changes of texture, as distinguished from atrophy resulting from simple decrease of bulk.

Degenerations also imply retrograde metamorphoses—(1.) As a gradual change of state which finally tends to annihilation of normal structure, with a proportionate diminution and final abolition of the normal function of the affected parts. This condition is exemplified in (*a.*) *fatty degeneration*; (*b.*) *cloudy swelling of parenchymatous inflammation;* (*c.*) *mucous softening*, or gradual liquefaction of tissues, such as bone in mollities ossium, and of cartilage in senile arthritis; (*d.*) *colloid degeneration*, characterised by the presence of a chemical compound, upon which the effect of acetic acid is neutral, it being an albuminate containing sulphur. (2.) Degenerations in the form of "*infiltrations*," in which the affected structures retain their external form, so that the component parts of a tissue or organ are easily identified—cells as cells, and vessels as vessels.

Such degenerations are—(*a.*) *fatty infiltration;* (*b.*) mineral degeneration, calcification, or petrifaction; (*c.*) pigmentation. (See *Science and Practice of Medicine*, under the head of "Degenerations.")

(10.)—LARDACEOUS DISEASE.

Lardaceous disease has hitherto been considered as an infiltration of the nature of a degeneration, but is now set forth as a substantive disease of organs by the College of Physicians.

The cut surface of an organ affected with this lesion has a semi-transparent appearance. The texture so affected feels like a piece of wax, or of wax and lard combined. It cuts into portions of very regular outline, with sharp angles and smooth surfaces. The affected tissue is normally translucent and hyaline. Water and alcohol and acids do not produce any change upon the material of the lesion. The organs so affected are increased in bulk, in solidity, in specific gravity, and in weight; anæmia is predominant, for the nutrient vessels are diminished in size from the albuminoid infiltrate pervading their walls. The lesion is generally widely diffused amongst the organs and textures of the body, and the smaller arteries are, as a rule, the earliest parts to be affected. Their coats become granular and thick, apparently from exaggeration of their transverse fibres, and at last, in the advanced stage, they become pellucid, transparent, and hyaline. From the arteries the lesion passes to the functional cells of the part, as in the liver, spleen, kidneys, lymphatic glands, and intestinal villi—the parts which are most frequently the seat of this disease. The lesion is recognised in the *post-mortem* room from the action of a solution of iodine when brought in contact with the cut surface of an organ affected with the disease. A deep violet-red colour is produced where the lardaceous material is present. This change is of the nature of a chemical re-action between the iodine solution and the material of the lesion.

The solution of iodine is composed of 12 grains of iodine dissolved in 24 grains of iodide of potassium to 3 ounces of water. (See *Science and Practice of Medicine*, vol. i., pages 99–108, for a more detailed account of this disease.)

(11.)—TUMORS.

These are the products of morbid growth, which remain permanent after having obtained a certain size, or which continuously grow. They are broadly classified into malignant and non-malignant, benign or "good by nature;" but no hard-and-fast line of separation can be drawn between these two classes.

The malignant character of such morbid over-growths consists in the tumor threatening life in one particular way, namely, by exciting a definite constitutional malady incompatible with the healthy nutrition of the organism. Such constitutional ill-health (cachexia) is indicated by increasing prostration of strength, diminution in the amount of blood, its watery character, emaciation, earthy tint of the skin, profuse sweating, diarrhœa, hæmorrhages. These are clinical evidences of malignancy, which are always *secondary to the local morbid growth*, and generally in direct proportion to its size, to any discharge from the tumor, and to the involvement of lymphatics and the digestive organs. Primary growths of this nature seem also to possess the property of exciting the development of similar growths elsewhere, and so gradually to extend their influence over the entire organism—a property and influence called "*constitutional infection.*" This constitutional infection proceeds by three modes or stages to affect the system; namely—(1.) By the continual production of new foci of growth at the periphery of the central growth, with which they subsequently coalesce by infiltration of the nutrient fluids of the growth into the surrounding tissues. The migration of specific cell-elements thus takes place from the original growths, which then proceed to proliferate and form secondary growths or foci in the neighbourhood of the original tumor, by which it is more or less rapidly increased.

(2.) By implication of lymphatic glands receiving lymph directly from the affected part through the lymphatics, which convey some material elements to these glands, directly infecting them, and causing in them a similar development to that of the tumor. Such material elements are, no doubt, the tumor-elements themselves, or such young germs as have acquired infecting powers, or even fluid conveyed from the malignant growth. "Migration of cells, followed by their fusion, underlies all formative activity." Implication of the lymphatic glands is therefore an unfavourable sign in connection with a tumor, because it is a proof of the infecting property of that tumor, and because these infected lymphatics and glands become new centres of infection.

(3.) By the production of secondary similar growths in other regions of the body, which are not in any direct anatomical continuity with each other. To this the name of "metastasis" has been given. It is believed that this mode of extension takes place mainly through infection of the blood, and it is usually the last process in the history of constitutional infection from malignant growths. The general current of the blood may so become contaminated through the lymphatics, or more directly by the passage into the blood-vessels of specific elements from the primary tumor, which has ulcerated through the walls of vessels, laying open their interior, which may thus receive, carry of, and disseminate through the body the specific element of the malignant growth. At the first set of capillaries sufficiently small in any solid organ to arrest these elements, there the secondary growths will develop themselves.

In malignant growth of the stomach and mesenteric glands, the blood, returning by the portal vein, infects the liver, and ultimately the lungs, with similar secondary growths; or the liver may be passed by and the lungs alone infected. Each and all of these modes of extension of primary growths infect the constitution, and are evidences of *malignancy;* and it may be further stated, that the *anatomical signs of malignancy* in a tumor are mainly based on their richness in blood-vessels and lymphatics—their comparative vascularity, the greater amount of juice-carrying quantities of amæboid active growing cells.

Malignancy is thus a clinical, and therefore a practical, rather than a theoretical character. It is not applicable to all tumors which endanger life. Any tumor may do so by mere position, size, or weight. A tumor or new growth, otherwise innocent as to anatomical constituents and infecting properties—such as fibroid growth of prostate or of uterus, may cause death; the former from retention of urine, the other by uterine hæmorrhage. The mere multiple character of tumors is no sure sign of their malignancy. The primary and independent origin of each may be due to the same cause, such as lipomata, fibromata, sebaceous growths, and warts. The multiplicity of cancers is a secondary phenomenon, and due to infection from the original growth. The growths termed *cancerous* (the *carcinomata*, namely, *scirrhus*, *encephaloid*, *epithelioma*, *colloid*) are pre-eminently malignant; but some *sarcomata*, *enchondromata*, and *recurrent fibroid* tumors are in some cases not less malignant than cancers—a property not always assignable to their being combined with cancer.

The recurrence of malignant growths at the seat of operation after their removal is another clinical characteristic of them. To a certain extent this circumstance may be explained by the fact, that although the main bulk of the growth is removed by the knife, yet, from the fact of its *infiltration* of the neighbouring tissue, and the growth of multiple foci of microscopic dimensions at its periphery, the removal has been *incomplete*. Some germs of specific growth have been left from which subsequent recurrence proceeds. These germs of growth extend to an indefinite and indeterminable extent beyond the original and obvious tumor. But there are also some growths which have this tendency without being malignant.

The morbid over-growths, now being considered, are characterised by internal continuity of constituent tissue-elements, and hence the name "Histoid tumors," because the majority of such tumors are made up of a single tissue. Sometimes, however, they consist of more tissues than one; and then the component tissues are never isolated, never marked off, as epithelium or muscle is marked off from connective tissue, but the component and varied tissues are in organic continuity with one another.

The mode of origin of histoid tumors is the same for all—the same as in fœtal development—*i. e.*, the material of which the tumor is built up is *embryonic tissue*, which by subsequent processes of differentiation, there grow all those varied tissues of a higher type which enter into the composition of tumors. An adequate amount of blood-vessels and blood-supply (*vascularisation*) maintains them in connection with the life of the body, and secures their further independent development and growth. Thus they grow and increase in size sometimes to enormous dimensions, without affecting the integrity of the body, and independent of surrounding parts.

The tissues from which tumors originate are the connective tissues and lymphadenoid tissue, of which they are "morbid over-growths." Wherever vessels extend, connective tissue extends, and even beyond them; hence it is so extensively distributed throughout the body, that it is impossible to make a cut at any point without exposing connective tissue at numberless parts of the cut surface.

Hence also the universality of new morbid over-growths — as tumors growing from and composed mainly of connective tissue—less so tumors of cartilage and bone; while, from muscles, nerves, and blood-vessels the development of new growths is comparatively rare.

Whence do tumors arise? Migration of cells, followed by their fusion, underlies all formative activity. Emigration of such cells as the colourless blood corpuscle brings them into contact with living tissue, and places them at rest, there to undergo fissiparous multiplication—the proximate and efficient cause of the growth of histoid tumors. Such fission in recent living cells may be seen to be the work of a few seconds; but for its activity and continuance, there is required an increase in the amount of protoplasm of the cells—a proportionate increase in the bulk of the original cell, which, with fission of the nucleus, thus makes up the first stage in the process of development of tumors. The next stage is fission of the cell itself—by simple division, gemmation, or endogenous cell-formation—the parent cell containing a brood of daughter cells.

The embryonic tissue which composes the earliest elements of tumors consists of nucleated particles of naked protoplasm, forming, when in quantity, a very soft and elastic substance, of a pale grey hue. These masses of protoplasm have no limiting membrane or cell-wall, hence they are termed "naked;" but they envelop a round, large, ill-defined nucleus, often only visible after the addition of water or acetic acid. The diameter of each mass is about $\frac{1}{2500}$ of an inch. They are identical with the "granulation" corpuscle, the "plastic exudation" corpuscle, the "proliferation of connective tissue" corpuscles, and the "accumulation of emigrant leucocytes."

The subsequent growth of such tissue into a tumor is the history of a differentiating process, by which these elementary embryonic cells are converted into the permanent continuous tissue of the tumor—sometimes of the same tissue throughout; or, more complex, as when they are made up of the elements of several kinds of tissue.

The mode of growth and the nature of tumors determine their anatomical relations to the surrounding parts. The malignant growths have no well-defined boundaries, because they increase at the periphery by infiltration of their tissue elements. In tumors of the connective tissue element, where growth mainly takes place at the circumference, such elements of new growth also infiltrate the tissues, and in this respect are similar in their character to cancers, and hence they are often apt to recur in the cicatrix after removal. These include *sarcomata* and some *fibromata.* In the lipomata, some fibromata, and the enchondromata, a capsule of condensed fibrous tissue usually includes the tumor and isolates it from the neighbouring tissue. In such cases growth takes place by continuous multiplication of the cells of which the original growth is composed.

The following are the products of morbid over-growth which constitute the clinical varieties of histoid tumors, as described by Rindfleisch:—

1. SARCOMATA.—These are mainly composed of the round cell embryonic tissue of granulations, small lymphadenoid tissue, spindle-cell tissue, or densely fibrous connective tissue. As a rule, several of these tissues are in combination; but one of them generally constitutes the main bulk of the growth, the others being present in smaller proportions; and, as results of secondary processes, cartilage, bone, mucous and adipose tissue are also found in them. There are many varieties of sarcomatous tumors. The following are described:—

(*a.*) *The granulation-like or round-cell sarcoma* is on section of yellowish or reddish colour, homogeneous throughout, like fish-roe, soft, yet elastic. A scanty juice may be scraped from the surface, nearly clear, and containing few cells, small in size, round, and with relatively large, sharply-defined nuclei, carrying nucleoli. These large nuclei are embedded in very scanty and naked protoplasm, as shewn by hardening and carmine staining of the tissue. They most commonly grow from membranous expansions of connective tissue, such as periosteum and the coverings of the nerve-centres, as also from skin, mucous and serous membrane, and glands. By development it may proceed to the small-cell, spindle-cell structure, and through that to fibroma—all of which forms are comparatively benign.

(*b.*) *The lymphadenoid round-cell sarcoma* has its cell elements much less closely together than the granulation tissue; and its cut surface readily yields a juice loaded with round cells, having large oval nuclei, feebly refracting light, and carrying each a point-like nucleolus. A delicate inter-cellular network resembling the reticulum of lymphatic glands pervades this form of sarcoma, giving consistence and support to its structure, permitting fluid to collect round the cells, and favouring their isolation.

This form generally grows from the subcutaneous, subfascial, and intermuscular connective tissue of the thigh or the lymphatic glands. Clinically, this form of sarcoma is extremely malignant.

There are two varieties—one the result of fatty degeneration, the other the result of mucous softening or degeneration, and so named, respectively, "*lipomatous sarcoma*" and "*myxomatous sarcoma;*" and sometimes these two forms co-exist, such tumors attaining a very great size. They occur chiefly in the lax connective tissue of the extremities, or in the subperitoneal connective tissue. This lymphadenoid round-cell sarcoma is very soft, brain-like, encephaloid, or medullary—by all which names it has been described; and it resembles closely—

(*c.*) *The alveolar round-cell sarcoma, including melanotic cancer*, sometimes described as *medullary sarcoma*, and regarded as a cancerous degeneration of a sarcoma. It is characterised by the occurrence of large cells, provided with round vesicular nuclei, carrying lustrous nucleoli, grouped in globular masses, and occupying gaps of corresponding size in the continuity of the connective tissue, or amongst spindle-celled sarcomatous texture. This form of sarcoma occurs most frequently in the marrow of bone, in the eye, and in the subcutaneous tissue; and a peculiarly malignant variety is characterised by the pigmentation of its cells—"*pigmentary cancer*"—a very soft and dark coloured tumor—"melanotic cancer."

(*d.*) *The small-celled, spindle-cell sarcoma* resembles in its constituents the spindle-cell elements of recent cicatrices—a short, narrow spindle-cell, containing an oval nucleus, with or without a nucleolus. The protoplasm of the cell is finely granular, and thickest immediately round the nucleus. A limitary membrane is of uncertain existence; the smaller cells are undoubtedly naked. These constituent spindle cells are regularly dovetailed into each other. No interstitial substance exists, beyond an amorphous glutinous cement keeping the cells together, often in bands or bundles of variable thickness, and radiating from numerous centres, so as to be interwoven in all directions.

Tumors of this kind grow by preference from fibrous membranes, fascial sheathes of vessels and nerves, the subcutaneous and submucous connective tissues. Such sarcomata may develop into fibrous connective tissue—*fibroma.* In tumors of the uterus the two forms are frequently combined.

(*e.*) *The large-celled, spindle-cell sarcoma* differs from the preceding four in the disproportionate development of its cells, as compared with all the surrounding elements of its structure. Its spindle cells may attain a thickness of ·015 of a line, and a length so great that, under a magnifying power of 200 diameters, the extreme ends of the cells are separated by three times the diameter of the field. The thickest part of the cell corresponds to the roundly oval nucleus, which carries a lustrous nucleolus. The protoplasm is finely granular and soft in the neighbourhood of the nucleus; elsewhere it becomes homogeneous, firm, tenacious, and rigid, but still with no limiting membrane. Sometimes the cells are stellate. These cells unite to form bands of considerable size, radiating in straight lines in every direction from a common base, or elaborately interwoven with each other. Such tumors grow to a very considerable size without undergoing further change of structure or composition; and they generally start from fasciæ and membranes, rarely from the interstitial tissue of glandular organs; and they seldom recur after timely extirpation. These fusiform or spindle-shaped cells are the same as "*fibro-plastic cells,*" constituting *fibro-plastic* or *fibro-nucleated* tumors. These are rapidly growing tumors; and when they slowly involve the adjacent soft structures, and return after removal, they have received the name of *Recurrent fibroid tumors.*

(*f.*) *The pigmentary or melanotic sarcoma* usually grows from the choroid coat of the eye, and next in frequency from the skin, the cell elements being infiltrated in both cases with black pigment, and appearing earliest in the epithelial cells lining the vessels. Such tumors are possessed of well-marked malignant characters; and the secondary metastatic deposits are usually also pigmentary, although developed in parts where no physiological pigmentation is known to occur.

(*g.*) *Fibrous sarcomata*, *fibroid tumor* or *fibromata*, are represented in structure by the formed tissue of cicatrices, consisting of a fibrous, reddish-white, stiffly-elastic substance, so dense, tough, and even hard, that it creaks or "crys" under the knife. It is made up of extremely fine fibrillæ. These fibrillæ are composed of a gelatinous material, and enclose fine cells between, usually small, roundly oval, and carrying lustrous nuclei. In addition, bands of spindle-shaped cells traverse fibroid tumors in every direction; and round deposits of embryonic cells lie embedded here and there amongst the continuity of the fibrous bundles. These are the transitional structures from which the fibres are developed. They are the most benign of all morbid growths, and the uterus is their favourite seat. They are circumscribed, and do not invade surrounding structures. When such tumors contain cysts, they are named *fibro-cystic;* when they contain earthy matter, *fibro-calcareous;* when they grow from bone, and are partly ossified, they constitute the non-malignant form of disease known as *osteo-sarcoma;* when they contain involuntary muscle, as when growing in the uterus, they have been called *fibro-muscular;* when they contain fat, *fibro-fatty.*

(*h.*) *The cavernous tumor* is a tumor of erectile tissue, like that of the *corpora cavernosa penis.* It consists of a network of white glistening trabeculæ of connective tissue, in whose wide meshes the blood is contained as in a sponge. It constitutes the *vascular tumor*, and also *nævous.* It originates in a fibroid degeneration of the capillary portion of the blood-vessels, while the arteries shew an enormous thickening of their walls, a tortuous course, and a capacity for dilatation, such as no healthy vessels ever exhibit. Such tumors grow by preference in the adipose tissue, and are not unfrequently multiple. They are occasionally malignant; but such malignity usually depends on a manifest complication with melanotic sarcoma, whose nodular foci have become developed in the trabeculæ of the cavernous tumor.

2. LIPOMATA, OR FATTY TUMORS.—These are principally made up of the elements of adipose tissue—the fat cells—and agree in structure with the normal fat cells of the human body and their relation to the septa of connective tissue. Such tumors are made up of lobules of a globular shape. They are examples of central growth, and are usually connected with the neighbouring parts at one point only by a stout vascular pedicle, while its external surface is limited by a large-meshed

connective tissue smooth capsule. They originate in the subcutaneous, submucous, subsynovial, subserous, subfascial, intermuscular, and intra-orbital connective tissue. At first they grow very slowly, then faster, and may attain a very considerable size—as large as a man's head, or larger. In such large tumors chronic inflammatory changes and fibroid transformation and mucous softening are apt to take place, as well as calcification of the fibrous matrix. The fatty tumors are decidedly benign, and once thoroughly extirpated never recur.

3. Enchondroma, or Cartilaginous Tumors.—They occur where no cartilage normally exists, and present the peculiar elastic hardness, the milk-white colour, and translucency of their layers which are characters of cartilage. All the minute anatomical forms of cartilage tissue may co-exist in an enchondroma; but as a rule hyaline cartilage predominates. The capsules are not always distinct; and, when entirely absent, are evidence that the matrix is beginning to soften. They generally grow from bone, the medulla being the source of the new growth, or from common connective tissue.

The protoplasm is of variable forms, such as stellate, and contains a nucleus. The tumor is usually made up of small lobules, not larger than peas, and hence capable of nourishment from their periphery. The formation of vessels and of true bone has been seen in enchondroma. In tumors of small size blood-vessels are abundant round the lobules, and in those of large size, round the periphery; but in the interior of the latter the blood-vessels are compressed by weight and growth, even to obliteration, so that degeneration charges are apt to be set up. Calcified patches are common. These tumors are frequently complicated with alveolar or soft sarcoma, and as such are malignant—otherwise, they are not so. But pure enchondroma are also liable to recur; gradual extension of the growth along the lymphatic takes place, metastasis to the nearest lymphatic glands, and even to internal organs, have been observed. The lung is the favoured site for such secondary enchondromata, but they are rare, and of small size. Four-fifths of all such tumors grow from the osseous system, more particularly the shafts of the long tubular bones, either from the medulla or the periosteum, especially of the bones of fingers and toes, where they are often multiple. They occur most frequently in early life; and, next to the bones, they grow in the parotid gland and testicle. They usually grow slowly, except those which proceed from the medulla of bone. These are rapid in growth, soft in texture, generally malignant, and not limited by a fibrous capsule.

4. Myxomata, or Mucous Tumors.—These generally originate by a

secondary metamorphosis of other connective-tissue substances; and tumors exclusively made up of "mucous tissue" are not common. They consist of a basis substance containing mucus, or of one which has undergone mucous softening. They are colourless, transparent, and soft, like a jelly; and if cells predominate, the tumor is white, reddish-white, or pale grey colour. Their juice on scraping is a tenacious mucilaginous fluid, containing the cell elements of the tumor. They are lobulated, and but sparsely provided with capillary vessels. They form nodular swellings, which may increase rapidly in size (although growth is usually slow), and this property, with their great softness, causes them to be mistaken for soft cancer. The favourite sites of myxomata are the subcutaneous areolar tissue of the thighs and back, and the external genitals in the female; the interlobular connective tissue, of the neck and face; and next, the medullary tissue of bones and connective tissue of the nervous system; they also grow from the placenta as *hydatid degeneration* of that organ. In the nervous system the tumor is often multiple. In the submucous tissue of the nose they constitute one form of nasal polypus. They are benign, and do not recur after complete extirpation. They occur generally late in life.

5. Osteomata, or Bony Tumors.—They occur usually in the form of *exostosis*, and vary as to hardness, being ivory-like or cancellated. They are benign, and their growth is slow. They are often hereditary and multiple, usually then occurring in early life.

6. Myomata.—These include all tumors mainly composed of true muscular fibre; and in them transitional forms between striped and smooth muscular fibre are often to be met with. To display the muscular tissue it is necessary to dissolve away connective tissue and fibres by maceration in dilute nitric acid, which will thus leave the muscular fibres isolated. The uterus is a frequent seat of these tumors. I have seen one as a large pedunculated tumor or polypus growing from the inner wall of the small intestines—ultimately inducing invagination of the bowels and death, by intestinal obstruction. They also occur in the prostate gland, œsophagus, and stomach.

7. Neuromata.—These are of two kinds—one represented by the well-known "painful subcutaneous nervous tubercle." This is essentially a fibrous tissue tumor, growing from the neurilemma of a superficial nerve. The nerve fibres become expanded over them as they increase in size, and are the source of great pain.

The other form is that of a tumor consisting entirely of nerve tissue, and it is exceedingly rare. Such tumors always originate from nerve-fibres, either cranial or spinal, and resemble them in structure, consisting of tubular nerve-fibres, with intertubular connective tissue, and a few grey nerve-fibres. They grow slowly, and never enlarge beyond a small nodule, which is generally solitary. Their most common site is at the divided end of a nerve, as in stumps after amputation; and are then often in connection with the tissue of the cicatrix—an involvement which is often the source of much pain. Clinically, however, they are benign tumors.

8. Compound Histoid Tumors.—These are such as have a number of different tissues entering into their composition; and, regarding these, it is to be observed that their prognosis is less favourable than that of simple tumors of any one of the several species of tissue which have been described. They usually recur as sarcomata after extirpation.

9. Lymphatic Tumors.—These are made up of the basis substance of lymphatic tissue—now called *adenoid* tissue. This tissue is known to be very widely diffused. It enters into the composition of the general lymphatic and mesenteric glands—the Malpighian corpuscles of the spleen and the glands of Peyer, the solitary glands of the large and small intestines, and the follicles of the pharynx and tonsils. It forms a definite plexus of tissue (perivascular canals) round minute blood-vessels, like those of the pia mater, and amongst the connective tissue round the bronchial tubes. It exists immediately beneath the epithelium of the pleuræ, the peritoneum, the mucous membrane of the alimentary canal, and in the medulla of bone. It is one of the special varieties of connective tissue—the *retiform* of Sharpey, the reticular or cytogenous tissue of Kôlliker, the *adenoid* of His. Within the meshes of its reticulum lymph-cells are enclosed, and these constitute the greater part of adenoid tumors, which are morbid over-growths of lymphatic tissue. The adenoid tumors — *lymphomata* — are generally the result of some specific irritation.

10. Glandular Tumors.—These are also named *adenoceles* or *adenomata.* They are tumors growing in or near a gland, and more or less perfectly resembling it in structure. They consist of epithelial cells, whose arrangement suggests the epithelial lining of the tubular or acinous glands, the cells being for the most part grouped round a central axis, as though they included a tubular lumen, but which is generally plugged with mucous or colloid matter, and having no outlet. It is an unlimited reproduction of glandular tubuli. Thus a tumor grows extravagantly rich in cells, and very scantily provided with vascular connective tissue. Thus it carries within itself the elements of destruction. They always

originate from a gland structure, especially the liver, the mammary gland, sebaceous glands, pineal gland, ovaries, and mucous follicles of the rectum, and the gland structures of mucous membranes generally, as in nose, pharynx, stomach, intestines, vagina, uterus, where they form *mucous polypi*.

Adenomata form globular, sharply-circumscribed nodules, which replace a comparatively small portion of the gland from which they spring. Each nodule increases by central proliferation, and tends to push aside, and not to infiltrate the neighbouring parts. Adenomata of the liver are encapsuled. Clinically, they are believed to be benign tumors; but they are very apt to be confounded with growths having malignant properties. Much has still to be learned regarding them. A simple adenoma may become cancerous. It may also become caseous from fatty degeneration of the enclosed epithelium. The gland tubes may also dilate into cysts, and mucoid softening is common.

(11.)—CYST.

A cyst is a form of lesion in which a sac or bag is filled with some substance (fluid, or more or less solid), which is produced as a secretion from its interior, or as an endogenous growth. No single hypothesis has, as yet, been sufficient to account pathologically for the formation of all cysts. An excessive augmentation of volume of the alveoli of the areolar tissue, with investing consolidation or excessive growth of germs in such tissue, and eventually, in either case, the cyst becoming analogous to a serous sac, are views which have been entertained regarding the pathology of such growths. There are also cysts which are doubtless formed by the obstruction, dilatation, and growth of natural ducts, sacculi, or follicles.

Cysts may be classified as to their mode of formation, as occurring—

1. By enlargement and fusion of areolar spaces in connective tissue.
2. By obstruction, dilatation, and growth of natural ducts or sacculi —so-called "retention" cysts—including *sebaceous cysts*, in which the secretions of the sebaceous glands are retained, and form *comedones* and *atheromatous* tumors; also *mucous cysts* retaining the secretion of glands of the mucous membrane; and *cysts* from retention of secretions in other parts.
3. There are cysts which are really substantive new growths, having a distinct elementary groundwork, derived from cells or the nuclei of cells—morbid in their growth from the beginning, and often reaching an enormous development.

4. Cysts have also been classified according to their contents—as *gaseous*, *serous*, *synovial*, *mucous* (Nabothian and Cowperian cysts, and ranula), *sanguineous*, *colloid*, and cysts containing *fat*, *oil*, or *milk*.

5. There are also proliferous or compound cysts, so named from the occurrence of secondary growths in the interior of the original cysts; cysts growing within cysts, or upon their walls, as in complex ovarian cysts—the cysts of the echinococcus parasite. Some cysts also are congenital, and have their origin in the inclusion of fœtal germs, or in the involution of skin or mucous structures of the fœtus, and carrying sebaceous matter, hair, teeth, bones, and such like formations.

6. Some growths also present the cystic form from the softening of tissue, as in enchondroma, sarcoma, and some malignant or cancerous tumors — the prefix "*cysto*" being used to denote the complication of some form of lesion (such as a tumor) with cysts.

(12.)—Parasitic Disease.

A great variety of lesions and symptoms of organic disorder are traceable to the occurrence of *animal* or *plant* life finding a subsistence within or upon some tissue, organ, or surface of the human body, as well as upon those of animals or plants. Thus many of these parasites and parasitic diseases are now proven by experiment to be capable of being transmitted or communicated indifferently from animals to man, and from man to animals. Each parasite is known to have an independent life of its own; each animal has parasites more peculiarly its own. Some parasites at certain stages of their existence are also known to pass or emigrate from the body of one animal into that of another, or from one part of the same animal to another cavity or viscus in it. It is mainly by vegetable or animal food, by drinking or bathing in impure water, that parasites find their way into the human body — into its most delicate tissues — as minute ova, embryos; or even as very minute but perfectly mature and even fecundated females —as is obviously the case with the guinea-worm, and perhaps also with the minute filaria recently discovered in the blood of dogs and man. The parasites thus undergo progressive stages of development towards maturity in each of the new localities where they dwell, finding subsistence and protection.

These are elementary facts in the science of parasitic disease; and it is necessary to ascertain the origin, source, and mode of entrance into the body of man of the parasites which infest his body, in order to prevent their occurrence. Seeing also that it is a characteristic of parasites to be transferred, and to pass from one kind of animal into another, it is necessary to be acquainted with the nature and existence of parasites in such plants and animals as constitute the food of man—fish, flesh, fowl, mollusca, and crustacea—fresh-water plants, and green food used as uncooked salads. Domestic animals also, which are not generally eaten, but which, being the companions of man, come like him to be infested with parasites, and so they tend mutually to propagate and perpetuate parasitic disease alike in man and other animals. A knowledge also of the generation and reproduction of individual parasites is absolutely necessary, in order to understand the nature and provide for the cure and prevention of parasitic diseases.

Parasites of animal organisation exist in man and animals in every grade of development, and the first lesson for the student to learn is how to distinguish parasites which are sexually complete from those parasitical growths which are destitute of sexual organs—which are immature larvæ or non-sexual parasites. These latter have often been described as distinct animals.

The human parasites are subdivided into—

(1.) ENTOZOA, (2.) ECTOZOA, and (3.) ENTOPHYTA and EPIPHYTA. The ENTOZOA consist of three classes, namely,—(*a.*) *Cœlelmintha*, or hollow worms, or worms with an abdominal cavity; (*b.*) *Sterelmintha*, or solid worms; and (*c.*) *Accidental Parasites*, which, living internally in some part of the human body, have thus far the habit, but are not referable to the class of entozoa.

The *cœlelmintha* consist of the following—two species of ascaris, the *ascaris limbricoides* and *ascaris mystax*, inhabiting the intestines ; the *trychocephalus dispar*, which also lives in the intestines, chiefly about the *caput cœcum* and lower part of the ileum ; the *trichina spiralis*, which encysts itself in the muscles, after migrating from the intestines ; the *filaria medinensis* or *guinea-worm*, whose habitat is the skin and areolar tissue ; the *filaria oculi*, living in the eye ; the *strongylus bronchialis*, inhabiting the bronchial tubes ; the *eustrongylus gigas*, inhabiting the kidneys and intestines ; the *sclerostoma duodenale*, inhabiting the duodenum ; the *oxyuris vermicularis*, a small thread-worm, inhabiting the rectum ; to which must now be added, the *filaria sanguinolenta*, a very minute (embryo?) filaridan, inhabiting the blood-vessels of man, recently discovered by Dr. T. Lewis, Surgeon in the Army Medical Department.

The class (*b.*) Sterelmintha, or solid worms, embrace the varieties of tapeworms and their cysticerci, or immature larvæ, the distomata, fasciola, hæmatobia, tetrastoma, and hexathyridium.

The tapeworms are—(1.) The *Bothriocephalus latus*, or broad tapeworm, endemic to man in some localities only. Its embryo is ciliated and developed in water, and the mature tapeworm inhabits the intestines; (2.) The *Bothriocephalus cordatus*, inhabiting the intestines of natives of North Greenland; (3.) The *Tænia solium*, a common tapeworm in the intestines of man all over the world where infected pig flesh is eaten; (4.) The *Tænia mediocanellata*, a common tapeworm in the intestines of men all over the world where infected ox and calf flesh is used as food; (5.) *T. acanthotrias;* (6.) *T. flavapuncta;* (7.) *T. Nana;* (8.) *T. lophosoma;* and (9.) *T. eliptica.* These five last-named are rare, and have been found in the intestines. The immature parasites of this class found in man are the cysticerci of some of these and of other tapeworms—namely, cysticercus of the *Tænia solium* and of the *T. marginata*, the *echinococcus hominis*, or hydatid of the *Tænia echinococcus*, a tapeworm of very minute size, living in the intestines of dogs and the dog tribe.

The remaining parasites of this class are—the *Fasciola hepatica*, inhabiting the liver; the *Distoma crassum*, inhabiting the duodenum; the *Distoma lanceolatum*, inhabiting the hepatic duct and intestines; the *Distoma ophthalmobium*, inhabiting the eye; the *Distoma heterophyes*, inhabiting the small intestines; the *Bilharzia hæmatobia*, inhabiting the portal and venous blood-vessels, especially those of the kidney, bladder, and rectum; the *Tetrastoma renale*, inhabiting the tubes of the kidney; the *Hexathyridium venarum*, inhabiting venous blood; and the *Hexathyridium pinguicola*, inhabiting the ovary.

The class of accidental parasites comprehends the *Pentastoma denticulatum*, inhabiting the liver and small intestines; the *Pentastoma constrictum*, inhabiting the liver and lungs of natives of the west coast of Africa; the *Œstrus hominis*, or larva of the gad-fly, inhabiting the intestines, and the *Anthomyia canicularis*, inhabiting the intestines, and becoming the exciting causes of some boils by their larvæ.

The parasites which compose the subdivision of ECTOZOA live on the skin, and comprehend the several species of lice, the itch-insect, and flea, namely:—

Phthirius inquinalis, or crab-louse, infesting the pubic region chiefly; *Pediculus capitis*, or head louse; *Pediculus palpebrarum*, infesting the eyebrows; *Pediculus vestimenti*, or body louse; *Pediculus tabescentium*, or louse of the aged or dying; the *Sarcoptes scabei*, or itch-insect; the *Demodex folliculorum*, or parasite of the hair follicles; the *Pulex penetrans*, or chigœ, infesting the skin and cellular tissue.

The parasites which make up the subdivision of ENTOPHYTA or EPIPHYTA, are of a vegetable nature, and mainly minute fungi. They are named as follows:—

Leptothrix buccalis, or alga of the mouth; *Oidium albicans*, or thrush fungus, seen in the mouth in cases of thrush, and on other mucous and cutaneous surfaces; the *Sarcina ventriculi*, found in the stomach; *Torula cerevisiæ*, or yeast plant, growing in the stomach and bladder; *Chionyphe Carteri*—a cotton fungus occurring in the disease called *Mycetoma*, of the hands and feet in natives of India; *Achorion Schönleini*, the parasite seen in cases of *Tinea favosa; Puccinea favi*, another form of parasite seen in that disease of the hair; *Achorion Lebertii*, or *Trichophyton tonsurans*; also a parasite found in *Tinea tonsurans.*

Microsporon Andouini, the parasite found in *Tinea decalvans; Trichophyton sporuloides*, the form of parasite seen in *Tinea Polonica; Microsporon furfur* is the form of parasite seen in *Tinea versicolor; Microsporon mentagraphytes* is found in the follicles of the hair in cases of *Sycosis* or *Mentàgra.*

The *sexually mature* entozoa inhabit the alimentary canal of animals or the cavities of the lungs, or such parts of the body as are in direct communication with the external air.

The *non-sexual*, or *immature* entozoa, so long as they are parasitic, *live enclosed in cysts*—such cysts being situated either in the parenchyma of organs (liver, lung), or in closed cavities, such as the peritoneum, pleura, pericardium, chambers of the eye, secreting tubes or blood-vessels. It is these *immature* parasites which are the most dangerous to the life of their *host.* They tend to destroy his life by the severity of the lesions they induce, and the destruction of parts which they cause, as they pass onwards to maturity.

For a detailed description of the natural history of these parasites, the reader is referred to the chapter in the *Science and Practice of Medicine* on this subject; or to the very exhaustive work of Dr. Cobbold on Helminthology.

(14.)—CALCULUS AND CONCRETION.

Calculus is a formation resulting from the deposit of all or of certain components of a fluid in which they are naturally held in solution or suspension: *concretion* arises out of a liberation of salts of lime from their normal combinations, so as to encrust or penetrate parts and sever minute textures; or *concretions* may also arise from stagnation of a secretion, when its mineral and protein compounds alike become solid.

The causes which lead to the formation of calculi are extreme concentration of fluid from loss of water; inspissation and exsiccation of secretions, such as mucus, ear-wax, bile, and the like; and, lastly, chemical decomposition of fluids.

The following are the elementary substances which compose the more bulky calculi and concretions:—

1. *Protein substances*, especially in the form of fibrine and albumen.

2. *Concretions of fat*, especially in the forms of *Elain* or *Olein*, of *Margarine* and *Margaric* acid, and of Cholesterine.

3. *Pigment concretions* from blood, urine, or bile.

4. *Concretions of Uric acid* and *Urates;* of *Uric acid*, as sediments in the urine, and as concretions of minute crystalline grains, commonly known as "gravel;" or as amorphous or crystalline concretions, from a size clearly visible to a very large size, when they are known as "stones" or "calculi;" and, lastly, of *Urate of ammonia.*

5. *Concretions of lime salts*, as *basic phosphate of lime*, or as *carbonate of lime*, *oxalate of lime.*

6. *Concretions of Ammonio-phosphate of magnesia.*

Protein substances, *gluten* and fat, with *phosphates* and *carbonates* of lime and magnesia, combine to form a series of more or less soft concretions, such as coagula within blood-vessels, free bodies (coagula) in serous cavities, concretions on the valves of the heart, contents of fat cysts, cretification of fibroid and cartilaginous textures, from deposit of bone-earth, a form of mineral degeneration.

Concretions of larger size, of denser and firmer structure, so as to form "stones" or "calculi," and of a varied composition, contain specific substances peculiar to the secretion from which they are formed, such as elements of bile in gall-stones, or of urine in calculi in the urinary bladder.

(15.)—Malformations.

Malformations are such deviations from the normal development of the organism of the body as occur in the earlier periods of gestation, or at least previously to the termination of fœtal existence. The origin of malformations may be due to the *germ* being originally defective from influences proceeding either from the male or female parent, as when the *same kind* of malformation repeats itself in successive procreations by the same parents, and are transmitted by inheritance on either side, sometimes extending through several generations. Another source of malformation is due to injury or disease of the ovum or fœtus, especially such as may arise from acute or chronic inflammation of the placenta, attachment of pseudo-membranes to the fœtus, and adhesion of the fœtus to the placenta. Impeded development of the fœtus—

"arrest of development" of one or many parts, while the others proceed through their normal course—is another source of malformation.

A detail of the elementary facts in "Teratology," and a classification or grouping of malformations, are fully given in *Science and Practice of Medicine.*

(16.)—FUNCTIONAL DISEASES.

When the concurrent living action of parts or organs are not maintained—in other words, when the concurrent exercise of function is not maintained—a morbid condition is at once established, to which the name of "functional disease" is given. Generally there is increase, diminution, or perversion of contractility, tonicity, nutrition, secretion, sensation, or of motion of parts, but without fever, inflammation, or other morbid alteration of structure. Although not attended with any obvious lesion that can be discovered, functional diseases are, in many instances, the cause of much suffering, usually of long duration, difficult of cure, having a great tendency to recur, and to terminate eventually in obvious organic changes. Examples of functional diseases are somewhat heterogeneous, especially when such discordant elements of disease are associated as *hydrophobia*, *epilepsy*, *neuralgia*, *tetanus*, *croup*, *chorea*, *paralysis agitans*, *hysteria*, *catalepsy*, *trance*, *hypochondriasis.* To these must be added the functional diseases of the heart, as *palpitation* and *irregular action*, and of the intestines, as *colic*, *vomiting*, *diarrhœa*, *constipation.*

(17.)—FEVER OR PYREXIA.

Fever is a condition of the body in which the temperature of the blood is elevated above the normal standard—a condition which may arise from an increased tissue change, having its immediate cause in alterations of the nervous system. It is thus an extremely complex morbid state which accompanies many diseases—the so-called "febrile diseases," and the "specific fevers"—as part of their course, with a more or less defined regularity, variously modified by the specific nature of the disease which it accompanies. A preternatural heat of skin with shivering, a quick pulse, intense thirst, scanty and high-coloured urine, are phenomena common to many diseases, and are the usual signs or accompaniments of the febrile state; and in all cases where fever is present there are two practical points to be determined, namely—(1.) The amount of preternatural heat, ascertained by accurate measurement; (2.) The amount of tissue change in relation to the amount of heat, represented by the weight and amount of all the excreta relative to the body weight.

The presence of fever is common to a great number of diseases—so much so, that diseases have been divided into two great classes, namely, *febrile* and *non-febrile;* and in diagnosing the nature of any disease, one of the first things to determine is the presence or absence of fever. Next, it is the exact sequence and combination of phenomena which must be determined in every case where fever is present—when symptoms sufficiently characteristic usually develop themselves in addition to the febrile phenomena sufficient to define the disease and clench the diagnosis, such as those seen in *enteric fever*, *scarlet fever*, *typhus fever*, *small-pox*, *ague*, *rheumatic fever*, *gout*, *pneumonia.*

Most of these febrile diseases commence with "shivers" or "rigors"—a symptom which, when fully expressed, is always of great importance. The shivering may be so severe as to induce chattering of the teeth, and to shake the bed on which the patient lies. On the other hand, it may be so slight as merely to induce paleness of the face and skin generally, with the feeling of coldness, or as if cold water were running down the back. In children it may be represented by convulsions. Such shivers generally mark the commencement of an illness more or less severe; hence it is always of importance to find out when the sensation of shivering was first experienced, in order to fix the date or time when the illness began.

When the fever is a result of some local lesion, such as an inflammation, the fever or pyrexial state is named *secondary* or *symptomatic* as to the local lesion.

When the pyrexial condition is primary, without any local lesion to produce it, or to account for it, the condition is called "*a fever*," or "*a specific*, *idiopathic*, *primary*, or *essential* fever." In such fevers the blood is believed to be primarily affected by the poison entering into its substance, and for the following reasons:—

(1.) A period of incubation indicates a time when the introduction of some specific poison has taken place.

(2.) The fact that such fevers run a definite course, during which time a very great destruction of tissue takes place, by the decomposition of which, in the absence of food, various substances of unstable chemical composition are formed, and which are attended with rise of temperature of the blood. The muscles, the structures of nervous system, the osseous system, and the red blood corpuscles waste away, while little or no fresh material is assimilated to compensate for the loss. At the same time, excreta may be either excessively eliminated, diminished in quantity, or absolutely retained in the system—the products of metamorphoses circulating in the blood—a retrograde metamorphosis which is increased by the accelerated action of the heart. In such cases critical discharges may occur at the close of the fever, or serious complication may occur during the course of the fever. Its type may assume a dangerous character, becoming *typhoid*, or *ataxic*, or *malignant*. Local complications may also occur, especially in the form of inflammation of solid organs, effusions in the joints, abscesses, and the like, which have sometimes been called the "*dregs of the fever*."

(3.) The possibility of introducing by inoculation a visible source of poison or virus, as in cow-pox and small-pox, leads us to believe that germs of specific poison also exist for other specific fevers. The poisoned condition of the blood may also be derived from changes taking place *within* the body, as in gout and rheumatism.

(4.) The blood is always altered in composition, so that there is a diminution of alkalies and the alkalinity of the serum. After a time, albumen and red corpuscles are deficient, and white corpuscles increase in number. The amount of fibrine varies as the fibrine-producing factors vary in amount.

(5.) The nervous systems, particularly the sympathetic and vagus, are paralysed as the fever increases and continues.

Increase of temperature is the first point to be determined, as it is the essential sign of fever; and the intensity of the fever is accurately measured by the amount of elevation of temperature above the average heat of the blood in a state of health—*i.e.*, 98°·4 in the axilla, or 99° in the rectum. The use of a clinical thermometer (self-registering) is necessary for this purpose, so made that the bulb may be introduced into the arm-pit or axilla, under the tongue, or into the rectum or vagina. From *five* to *ten* minutes the thermometer must be left in any one of these situations.*

The reader is referred to *Science and Practice of Medicine* for ample details as to the make and use of the clinical thermometers, and the use of tables on which records of temperature, pulse, and respirations, and amount of excreta, may be recorded.

As a general rule thermometric observations are best made in the axilla; and if the temperature there persistently exceeds 99°·5 Fahr., the condition must be regarded as one of fever. The range of increase of temperature varies according to the nature of the disease; so much so, that ranges of temperature, if carefully observed from day to day, are typical of certain diseases.

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* Casella of Hatton Garden, Hawksley of Blenheim Street, London, and Harvey and Reynolds of Leeds, are the most careful makers of clinical thermometers in my experience.

The intensity of the fever is denoted by the degrees of elevation above the normal standard—an intensity which may be represented by two, four, six, eight, ten, or even fourteen degrees. The intensity, however, rarely exceeds 105° or 106° Fahr.—seven or eight degrees above the normal. Such temperatures indicate hyperpyrexia, and when the temperature exceeds 107°, fever is so excessive that danger of death is great. In rare cases of enteric, relapsing, and scarlet fevers, temperature may rise to 108° Fahr. or 110° Fahr. Such cases prove fatal;—so also in rheumatism temperature has been known to rise as high as 110°·2 Fahr. to 111°·2 Fahr. before death; and in cases of tetanus, as high as 112°·55 Fahr., the highest temperature yet recorded in man. The temperature may continue to rise for some time after death.

There is also a co-relation to be noted between temperature, the pulse, and the respirations in fever. An increase of temperature of one degree above the normal corresponds with an increase of about *eight* beats of the pulse per minute. A pulse varying from 64 to 76 in health goes up to 72 and 84, or 80 to 90, and thence to 90, 100, 120, or more. But increase of pulse is not constant in fever; and it is only a sign of fever when associated with increase of temperature. Increased frequency of respiration (from the normal range of 15 per minute) is usually in proportion to the rise of the pulse, and is usually always in excess; but there are two conditions in which the number of respirations may be quickened beyond the usual co-relation, namely, in inflammation or other organic lesion of the lungs, and in paralysis of cerebral origin.

The amount of fever, as measured by the increase of temperature, is attended with wasting of the body in proportion to the amount of *excreta* from the skin, the kidneys, and the mucous surfaces. A rapid disintegration of the nitrogenous tissues takes place, and there is little or no assimilation of food to compensate for the loss. Great muscular prostration and loss of weight are the consequences of this condition; and if such excreta were to be retained, and not eliminated, the cerebral symptoms known as *typhoid* would ensue, or local lesion would result, such as secondary inflammations. In the study of cases of special fevers the quantity of *excreta* passed by the urine ought to be carefully measured by the student, as one of the best methods of obtaining an index for appreciating the changes going on in the body during the course of the fever.

The course and progress of fevers, as well as the severity and special combination and succession of certain symptoms, give characters to the febrile movement which are typical; and hence there are certain *types of fevers* to be clinically recognised, namely—

(1.) Those in which the febrile movement runs a regular course uninterruptedly as to increase of temperature from day to day—the temperature rising continuously up to the maximum, without decided exacerbation or relaxation, till the *acmé* of the fever is reached, after which defervescence sets in. Such a type of fever is called "*continued*"—*e.g.*, typhus, small-pox, measles, scarlatina, inflammatory fever.

(2.) When marked abatement, lull, or remission in temperature and other symptoms occurs, lasting for some time, and followed by exacerbations of all the phenomena, this type is called "*remittent*," and is seen in fevers of tropical climates and malarial districts, especially in summer and autumn, also in enteric fever, and in hectic fever.

(3.) When periodic paroxysms of fever occur, each commencing with a chill or cold stage, lasting from half an hour to an hour, and ending by excessive heat of surface and active febrile symptoms, resulting after several hours in a sweating stage, which completes a paroxysm, and the patient appears then, for the time, quite well; but in from 24 to 70 hours the paroxysm repeats itself:—such a fever is called "*intermittent*" in type.

This intermittent type includes several forms. When the paroxysm repeats itself in 24 hours, the fever is of "*quotidian*" *type;* in 70 hours, of the "*quartan*" type; when it repeats itself in 48 hours, the type is "*tertian;*" when a daily paroxysm, corresponding in time and severity, repeats itself on alternate days, the type is "*double tertian.*" These types are represented in the different forms of ague. The period between the beginning of two paroxysms is named the "*interval,*" and includes one paroxysm with its succeeding *intermission* or *œpyrexial* stage.

(4.) When fevers are characterised by distinct periodicity as to their phenomena, exhibiting intervals during which the patient is wholly or nearly free from febrile disturbance, this *type* is sometimes described as *malarial.*

Fevers of this type betray a common origin by strong family likenesses. They are alike in occurring in low swampy places—alike in their phenomena, and in the difficulty in eradicating the *malaria* poison from the system—alike in secondary lesions, such as enlargement of spleen and liver, and similar as to alteration of blood, which they leave as stamps of their existence.

(5.) Some of these malarial fevers are characterised by pernicious, malignant, or destructive characters while at their height, as indicated by intense congestion of one or of several internal organs (cerebral, thoracic, or gastro-enteric), and extreme perversion of innervation. This is the "*congestive*" type of fever.

(6.) When fever is not severe, nor prolonged, nor combined with any lesion, the type is "*simple fever.*"

(7.) When fever is severe, and febrile re-action is the strongest; the pulse firm and incompressible, full, sharp, and frequent; the skin hot, dry, and retentive of its increased temperature; the thirst intense: urine high-coloured, with a thickly furred and moist tongue; loss of appetite and constipation; the face flushed, febrile pains in head and other parts intense; the senses often preternaturally acute; delirium, if present, attended with increased rapidity of thought, and sometimes with violence, the *type* of such fever is "*sthenic*" or "*inflammatory.*" The blood readily shews a "buffy-coat," indicating increase in fibrine-forming factors. It is a type usually associated with the onset of local and acute inflammations, especially in young and plethoric persons.

(8.) When there is extreme debility of the vital actions, and a feeling of great prostration of mind and body, as shewn in the voice, attitude, and muscular movements—when the temperature is only three or four degrees above the normal, with heat of surface easily depressed, the pulse soft and easily compressed, such a condition represents a *low type* of fever, sometimes also called "*asthenic*" or "*adynamic.*"

(9.) When combined with extreme prostration, there is great confusion of thought, impairment of intellect, low muttering delirium stupor, more or less unconsciousness, sometimes passing into coma; involuntary voiding of the excretions, frequent muscular tremors, and *subsultus tendinum*, even when no exertion is made; extreme derangement and diminution of the secretions, the tongue dry, brown, and crusted; the secretions of the mouth viscid, dry, and dark-coloured, so that the teeth and gums are covered with "sordes;" the surface of the body dry and its heat pungent, but easily reduced; the heart's action greatly impaired, as indicated by its feeble impulse and sounds, and by the rapid, small, and soft pulse, often also irregular and intermittent,—such a condition is known as a "*typhoid*" or "*ataxic*" *type* of fever, and such a combination of symptoms being also often described as "*the typhoid state.*"

(10.) When, in addition to such a combination of symptoms, the state of the blood is markedly altered, so that its putrescency becomes obvious; when petechiæ, or vibices, and passive hæmorrhages occur, or even gangrene, the fever is of the "*malignant,*" "*septic,*" or *putrid type.*

(11.) When suppuration is prolonged, and the formation of pus continuous, or when there is excessive waste of the bodily substance, as by secretions beyond the powers of the constitution to supply the process; when there is a drain on the system beyond its means, a febrile condition is set up, so that a period of remission and a period of exacerbation occurs once and sometimes twice in twenty-four hours. Much sweating attends and terminates each paroxysm of this kind, and hence also great exhaustion. This *type* of fever is termed "*hectic.*" It begins and creeps on very insidiously—almost imperceptibly at first. The pulse is subject to temporary quick excitement from very slight causes. Heat is especially felt in the palms of the hands and soles of the feet. The excitement of the pulse continues to be daily more and more easily induced, while it daily loses in power, and increases in frequency. It expresses a middle condition between the inflammatory and typhoid type. A periodic exacerbation regularly commences towards evening, reaching its height about midnight, and terminating towards morning in most profuse perspiration. This sweating is sometimes called "*colliquative*," because it seems to "melt the patient down," and may be replaced or accompanied by diarrhœa. When a second paroxysm occurs, it is generally in the morning, after the breakfast period. The pulse at the height of the paroxysm may reach 120—the beat is a jerk—the irritable pulse of a weakened heart. The heat of skin is so distressing that the scantiest covering can scarcely be endured. The respirations are quick and short. The appearance of the face is characterised by a florid circumscribed suffusion in the form of a bright red, or pink spot, contrasting strongly and often beautifully with the pale cheek, the bright and sparkling eye, the clear, pearly white sclerotic, and commonly known as the "*hectic flush*" of the cheek—so well described by Dickens in the death of "Smike," as related in his novel of *Nicholas Nickleby*.

Points to be attended to in the differential diagnosis of fevers, and in determining their most palpable characteristics:—

(1.) Determine whether the fever is *symptomatic* or *idiopathic*. This is not generally difficult. The history of the case, with absence or presence of definite local pain and disturbance, will generally be sufficient. It must not be forgotten that with the advance of diagnosis many affections have passed from the domain of idiopathic fevers to that of inflammation of certain textures, and therefore to symptomatic fever,—*e. g.*, many cases of so-called *gastric fever* are in reality subacute inflammation of the stomach; *brain fevers* turn out to be cases of meningeal inflammations; *lung fevers* turn out to be cases of peripneumonia, and hundreds of cases every year are sent to the fever hospital in London, with certificates from medical men that the case is one of idiopathic fever, which afterwards turns out to be erysipelas, pleurisy, pneumonia, or disease of the kidney or liver.

(2.) Obtain facts for a natural history of the fever drawn from each case by clinical notes from day to day; determine the day and hour of the commencement of the fever if possible, and the date of exposure to any cause or source of infection, so as to fix a period of incubation.

(3.) Measure the amount of fever heat at least three times daily (in twenty-four hours) by a clinical thermometer, and thus obtain a daily range of temperature, and a curve for the whole disease, shewing the degree or amount of fever-heat, as well as the course and mode of progress of the disease.

(4.) The duration of the fever in every case is to be determined by the thermometer ceasing to indicate a temperature above the normal standard.

(5.) The daily amount and daily range of the excreta are also to be as correctly determined as possible. These are to be judged of in relation to the weight and age of the patient. Measure the whole urine passed in the 24 hours, and take its specific gravity, from which a rough estimate may be formed of its solid constituents. Multiply the number of cubic centimetres of urine thus measured as passed in the 24 hours, by the figures representing the specific gravity, and the result represents roughly the amount of urinary solids in grammes; or, knowing also the amount and specific gravity, the percentage of "*solid urine*" may be estimated by Trapp's formula—according to which, if the *last two* figures of the specific gravity are doubled, the quotient represents the number of parts of solids contained in any 1,000 parts of urine, so that 1,000 grains of urine, having a specific gravity of 1,010, would contain 20 grains of solids. This formula is only applicable to urine of a low specific gravity—1,000 to 1,018. The best formula for urine of 1,018 to 1,038 is that of Sir Robert Christison—multiply the last two figures of the number expressing the specific gravity by 2·33, and the result is the total of parts of solids in any 1,000 parts of urine. Thus, 1,000 grains of urine, having a specific gravity of 1,025, would contain 58·25 grains of solids. With these data, the use of Professor Haughton's table will indicate the amount of urea. (See Vital Table in *Science and Practice of Medicine*, 6th edition, p. 258, vol. i., by the Author.) The intestinal discharges ought also to be noted, and the activity or torpor of the cutaneous and pulmonary functions taken into account.

(6.) The symptoms and phenomena *in sequence* are to be carefully observed; so that the *type of the fever* may be determined, as indicated at page 65 *ante*, and any skin eruption as to its time of appearance, what part of the body it first appears upon, how it extends, its amount, its exact anatomical characters, elevation or not above the skin, its colour, and any changes it goes through in the course of the disease, the length of time it continues visible; and if it leaves any stain or mark behind it, or persists after death.

(7.) The co-relation of temperature, pulse, respirations, amount of the several excreta and general symptoms, *i. e.*—(1.) The co-relation of the temperature and pulse beats; (2.) The co-relation of the pulse and respirations; (3.) The co-relation of the amount of excreta, with general or special symptoms, crises, or lesions.

(8.) Mode of accession of symptoms, as to being sudden or the reverse; whether the rise of temperature has been rapid or slow; sequence of early symptoms up to highest temperature; any *special symptoms* pointing to disorder of special organs or parts of the body,—every individual organ being subjected to daily examination. Thus complications are determined as to their being constant or accidental in certain fevers, as well as the modes of crisis, and progress of defervescence.

(9.) The morbid anatomy to be investigated as regards every organ.

(10.) Causes are to be especially investigated and the modes of propagation—if by contagion alone, or by other modes in addition to contagion. The practical points to be determined with regard to contagion are—(1.) To find out if the closer and more frequent the contact of attendants with the sick, the greater the number attacked by the disease; (2.) If the disease is propagated by human intercourse from one locality to another; (3.) To determine the limits of area of infection and extent of diffusiveness of the disease-poison—either by air or by water.

These are the points for scientific investigation in cases where any fever is met with for the first time, the nature of which is not clearly determined. Some uniform method of inquiry is necessary to bring out characteristic differences amongst idiopathic fevers.

The symptoms of a specific fever *in sequence* are usually—

(1.) A period of incubation, more or less definite for each kind of fever, at the end of which certain symptoms, called *premonitory*, set in —namely, chilliness, rigors or shivers, nausea, vomiting, headache, lassitude, pains in the back or limbs, restlessness, sleeplessness, or delirium, when the patient is said to be "*sickening*" for the particular disease.

(2.) Increase of temperature, of pulse-rate, and of respirations; great thirst, scanty urine, red in colour, very acid, strong odour, and high specific gravity, containing excess of uric acid and urea; alkaline chlorides usually deficient. The urine also appears thick.

(3.) The functions of the alimentary canal from the mouth downwards are greatly deranged and impaired. The secretions are dried up, the tongue dry and furred, and the mouth dry or clammy. There is generally thirst, and the bowels are constipated. The desire for food is entirely lost *(anorexia)*.

All these phenomena indicate retention of water in the system, a constant condition in fever.

The characteristic disturbances in the nervous system have their origin partly in the high temperature of the blood, and partly in its vitiated condition. They are especially the subjective phenomena in the early stages—chills, rigors, pains, soreness, exhaustion, languor, inaptitude for exertion of any kind, mental or bodily, headache, restlessness, sleeplessness, delirium, stupor, coma, tremors, subsultus tendinum, picking of the bedclothes, convulsions.

A fever terminates when the temperature reaches its normal standard; and the period between the height of the fever and the attainment of the normal heat of the body has been named the period of *defervescence*, or of cooling down.

(1.) This may commence suddenly, as by *crisis*, when the temperature falls in a very marked and sudden way in a few hours—all the excretions being suddenly increased. This mode of defervescence is often a source of considerable danger, and hæmorrhages, such as epistaxis, may occur.

(2.) A gradual cooling down may occur, the subsidence taking place slowly and regularly for several days, and without any marked increase of excreta. Such defervescence is said to be by *lysis*.

(3.) A combination of these two modes of defervescence may occur by a rapid fall with critical discharges, and then a slow lowering of temperature follows, or high and low temperatures may succeed each other daily.

During convalescence the temperature and excreta are sometimes below the normal; and after some fevers, such as measles in young persons, the temperature has been known to continue permanently below the previous normal standard.

CHAPTER V.

MODES OF DEATH IN DISEASE.

The modes by which diseases (acute and chronic) terminate fatally vary so much, that careful study is required in order that the management of any disease may not be such as to favour any of these natural modes of death, but rather such as to ward them off, thwart them, and promote natural modes of recovery; for in constitutions which are unimpaired there may be always recognised a tendency to a spontaneous favourable termination of diseases. To foster this tendency is the aim of all our efforts to cure diseases.

Death may happen from decay of life, as in old age; but the life of man may terminate by various modes of dying—death beginning at the *heart*, the *brain*, or the *lungs*.

(*a*) Death by *syncope*, as when the heart's action ceases from loss of blood, or decline of aortic pressure, is indicated by paleness of the lips, countenance, and surface of the body; cold sweats, dimness of vision, dilated pupils, vertigo, a slow, weak, irregular pulse, and speedy insensibility. Sudden and excessive loss of blood is attended by nausea, or even vomiting, restlessness, tossing about of the arms, irregular sighing breathing (*anxietas*), delirium, and death generally after one or two convulsions.

Anæmia is characteristic of this mode of death.

(*b*) Death by *asthenia*, when the contractile power of the heart fails from loss of ganglionic nerve-power. The pulse becomes feeble and frequent, and may cease to be felt, muscular debility is extreme, but the senses may remain perfect, and often painfully acute, with the intellect clear to the last.

Fainting is characteristic of this mode of death, as distinct from *syncope*.

(*c*) Death by *starvation* is a mode of dying in which syncope and fainting are eventually combined.

(*d*) Death by *suffocation* occurs when the function of respiration is suspended, as when the access of air to the lungs is prevented. The symptoms of approaching death in this way are strong but ineffectual efforts to contract the respiratory muscles, struggling efforts to respire, amounting to agony of short duration, followed by vertigo, loss of consciousness, and convulsions; finally all efforts cease, twitchings or tremors of the limbs alone remain, the muscles relax, and the sphincters yield. The heart may continue to beat for *three minutes and fifteen seconds* after all other signs of life are past, and even the pulse may be felt. On this fact rests the hope of resuscitating persons dying in this way, if artificial respiration be timeously resorted to and persevered in.

(*c*) Death by *coma* occurs when consciousness is lost in an appearance of profound sleep, from which the patient cannot be roused, or only partially. There is a gradual blunting of sensibility to external impressions, slowness of respiration—the respiratory effort being often delayed, and finally performed with a sudden noise and jerking effort—to which the name of *stertor* or *stertorous* breathing has been given. Here death commences at the *brain*.

CHAPTER VI.

PRINCIPLES WHICH GUIDE THE TREATMENT OF FEVER AND INFLAMMATION.

I.—*As regards Fever.*

STATED generally (as by Dr. Murchison, in his great work on Continued Fevers), the treatment of fever consists in such a combination of measures as will accomplish the following results:—

(1.) *The reduction of excessive heat* (*hyperpyrexia*).—This, as well as the frequency of the heart's action and the respirations, is to be effected chiefly by the application of cold in various ways—as by means of the general cold bath, affusion by cold or tepid water, or douching when the patient is in a warm bath, packing in a wet sheet, sponging the surface of the body by water, either tepid or cold, and the use of ice applied in bags, or of ice-cold water by enema.

In ordinary and not severe cases sponging the surface of the body with cold or tepid water is sufficient; and in all cases such sponging helps to keep the body cool, and is a source of great comfort to the patient, or repeated packings in a wet, cold sheet, or a warm bath, gradually cooled. In severe cases the general cold bath, with or without affusion, or the shower bath, is necessary; and to be of use, it must be employed as soon as the temperature of the patient rises to 103° Fahr., and before the third or fourth day of fever. Great caution is necessary, because the lowering of temperature continues to go on to a minimum after the bath has been used. From four to twelve baths may be necessary during the twenty-four hours, the treatment being repeated as soon as febrile re-action again reaches 102° or 103° Fahr., as it may do in two, three, or four hours' time. In the general bath the patient must be immersed completely in water of 95° Fahr., which in the course of twenty to thirty minutes is gradually cooled down to 60° Fahr. by the addition of cold water. The time of immersion is to be regulated by the result, and the patient, when removed from the bath, is at once dried and put under bedclothes as usual, with warm water-bottles, or a hot brick enveloped in flannel applied to the feet, if they are cold.

Cold affusion is most useful when cerebral symptoms are severe; the patient sitting in an empty tub or sitz-bath, has four to six buckets of cold water, 50° Fahr., poured over him from a height of about two feet. The trunk of the body ought then to be well rubbed with towels, before and behind, till the skin becomes red.

The use of the *douche* causes the water to impinge on some particular part, such as head, shoulders, joints, or perineum. Such douches of cold water often give great relief to the severe headache of acute specific fevers.

The good effects of cold applied to the surface by such appropriate means is to lessen the frequency of the pulse and respiration, at the same time as it reduces body heat; to render the tongue moist and soft; to diminish or remove stupor; to procure refreshing sleep; or, to induce such a perspiration as may bring relief.

Blood-letting reduces temperature; but it cannot be borne in specific fevers.

Infusion of digitalis cautiously used in small doses at long intervals, the use of *sulphurous acid* in drachm doses every two, three, or four hours, or of quinine in considerable doses (5 to 20 grains), all tend to reduce temperature.

(2.) *To secure sufficient but not excessive elimination of excretions—the products of metamorphoses*—it is necessary to watch how the functions of the kidneys, liver, intestines, skin, and lungs are carried on, as the remedies must be so arranged as to meet the requirements of each case in these respects. If urinary excreta are deficient, and the symptoms point to retention of urea, *chloride of sodium, the alkaline salts of soda and potash, citrates of potash and ammonia, liquor ammoniæ acetatis, saline laxatives*, and a free use of water, pure and cold; or of diluents, such as barley water, toast water, apple water, gruel, orangeade, lemonade, tamarind water, currant water, raspberry vinegar, seltzer and soda water, tea, cold, with a slice of lemon in it and no milk or sugar,—all may be tried by turns, drinking small quantities at a time and often. Five grains of nitrate of potash, or 15 minims of spirit of nitrous ether, every three or six hours, with a table-spoonful of fluid, is a useful diuretic; also nitre-whey, prepared by boiling ʒii. of nitre in a pint of milk, and straining; or "imperial drink," which consists of ʒi. to ʒii. of bitartrate of potash to a pint of boiling water, and flavouring with lemon and sugar, to be used as a drink as often as possible. It may be necessary also to stimulate the region of the kidneys by hot fomentations or mustard poultices over the loins.

Actual purgation or *diaphoresis* must be induced with great caution. Excessive elimination by *diarrhœa* (as when stools exceed three to five daily) or *sweating*, requires to be held in check.

(3.) *To act restoratively on the exhausted semi-paralysed nervous system, to neutralise the effects of any specific poison which may have set up the fever, to improve the state of the blood, to maintain as far as possible the nutrition of the body, and to stimulate, when necessary, the action of the heart by appropriate food, as well as by alcohol and other stimulants.* These aims embrace some of the most important and difficult details in the management of fever cases. The *restorative agents* of the exhausted nervous centres are especially food of a nutritious kind, and of easy digestion, given at frequent and regular intervals of not longer than four hours, and in small quantities at a time; and, the smaller the quantity the more often it must be given, even if it is necessary to waken the patient out of sleep. Milk, beef-tea, eggs, soups, broths, panada, rice cream, rice and milk, are the most valuable articles of food. *Barley water*, *gruel*, *lemonade*, still or effervescing; arrowroot drink; coffee infusion, made nutritious with hot new milk, and with or without an egg beat up in it; or milk with isinglass, and variously flavoured with cinnamon, almonds, and sweetened with sugar, or with fruit, jellies (black currant, pine apple, strawberry, red currants, cherries, or plums). All such drinks may be taken with ice, if requisite or desired by the patient. Of all diets, milk is the best, or an oleaginous diet. It may be necessary to give food every hour, not oftener, or every three hours after the fourth day of a severe fever.

Amongst medicinal agents, *phosphorus and the hypophosphates of potash, soda*, and *lime*, given in *camphor water* to the extent of five grains of the salt, three or four times a day; also the *acid phosphate, dil. B.P.*, in doses of 25 to 40 drops. *Camphor* in small doses is also of use in the *low forms* of fever. (See types, p. 65, *ante.*) In doses of 20 grains it subdues delirium. The *mineral acids* are also of service. Large doses of *carbonate of ammonia* are to be avoided.

As to *alcohol*, the phenomena of the radial pulse and of the heart must guide its administration in fever. When they flag, it must be given; if they do not flag, alcohol is unnecessary, and may be injurious. A soft compressible pulse, and still more an undulating, irregular, or intermitting pulse, or an abnormally slow pulse (40 to 60), are indications for its use much more urgent than mere rapidity; so also a weak impulse of the heart, or an impaired or absent first sound. Other indications for its use are—a burning dry skin; profuse perspiration, with no improvement in the general symptoms; coldness of the extremities; a dry, brown tongue. The more the typhoid type (see *ante*, p. 65) is expressed, the greater is the need of alcohol. Alcohol is contraindicated if delirium is increased under its use; also, if delirium is noisy and acute, if there be severe darting and throbbing headache, co-existing with great heat and dry skin, flushing of face, suffusion of eyes, and no impairment of cardiac or radial pulse; if there be scanty urine, with a low specific gravity, containing little urea or much albumen; also suppression of urine.

The good effects of alcohol are shewn by the quick pulse becoming slower; by the tongue becoming clean and moist at the edges; by restlessness and delirium giving place to rest and tranquillity, and perhaps to sleep.

Spirits, in the form of brandy or whisky, are best during the fever movement; malt liquors are best during convalescence. The spirits ought always to be diluted to the extent of their volume by water or milk; and if coldness of extremities or of skin prevail, the milk or water must be made hot. Such stimulants are to be given in divided doses, frequently repeated—in urgent cases as often as every hour; in larger doses during the night and towards morning, than during the day.

The nature of the case and the symptoms demanding alcohol must regulate its amount; but a table-spoonful every hour is an excessively large dose—*i. e.*, 12 ounces daily; but whatever the amount prescribed (and it ought to be as accurately prescribed as medicinal substances), the dose ought to be reduced or given at longer intervals as soon as the symptoms yield for which it was given.

There is no evidence of actual elimination of any specific disease-poison through any one of the excretory channels. Neither diarrhœa, diuresis, nor sweating are shewn to carry away the poison of any specific disease. It is, no doubt, through the more or less rapid metamorphoses of tissue which goes on as the patient's system struggles with the fever, that the gradual elimination of the deleterious products takes place. Time is an important element in every case; and while food and alcohol, given at the proper time and in the proper way, maintain the system through the struggle for existence, the eliminating organs must not be stimulated to undue secretion, nor congestion be induced, nor increased work thrown by over stimulation or over feeding on the overtasked glandular organs. If the patient can be kept alive during the febrile movement, the poison and the disorder will together pass away.

(4.) *To relieve distressing symptoms.*—(*a*) *Headache* may be relieved by an emetic, or by inducing action of the bowels, or by evaporating lotions to the forehead, such as vinegar and water, with solution of muriate of ammonia, or by bladders of ice over the shaven scalp, or by affusion of cold water, or pouring cold water (40° to 50° Fahr.) over the patient's head, as it hangs over a basin at the edge of the bed. Sometimes, as in the aged, warm fomentations are best; while in very young and robust, leeches to the temples give relief. (*b*) *Sleeplessness* may be overcome by opiates, combined with stimulants, if not otherwise contraindicated; or by the hydrate of chloral. (*c*) *Tympanitis* is best relieved by turpentine stupes over the abdomen, or by enemata of turpentine, assafœtida, and rue, or turpentine may be given internally, combined with tincture of perchloride of iron. (*d*) *Hiccup* may be relieved by sucking ice.

(5.) *Hygienic management.*—*Good nursing* is absolutely necessary in the management of all specific fevers. *Fresh air*, and plenty of it, are also important conditions of success—thorough ventilation being secured by open doors, open fire-places, and open windows. No carpets, bed-hangings, nor unnecessary articles of furniture should be in the patient's room, which ought to be large and airy. Its temperature ought to average 60° Fahr. The patient ought to lie on a hair-mattress, or on a spring-bed, with a moderate amount of bedclothes, and not weighty, over him. Cleanliness, especially as to the perineum and genitals, must be carefully attended to; and in cases where cerebral oppression exists, attention must be given regularly, at least twice daily, to the condition of the bladder, and the catheter used if necessary. The state of the urine is also of importance to watch.

(6.) *Complications and sequelæ must be watched for.*—The thermometer is here of great use, combined with observation of the respiratory functions; for pulmonary complications are those most frequently met with in the form of bronchitis or hypostatic congestion. Diarrhœa and bed-sores may also occur in the course of severe and long-continued fevers. Bed-sores are to be prevented by annular air cushions or water pillows; and as soon as any redness appears on the sacrum or hips, or on any other part subject to pressure, it should be kept dry and painted over twice daily with a mixture of collodion and castor-oil, or with the white of eggs beaten up in an equal volume of rectified spirit, or with a solution of gutta-percha in chloroform (one drachm of sheet gutta-percha to one fluid ounce of chloroform). If sores actually form, stimulating poultices are to be applied till the slough separates. The stimulants to be thus used and covered with the poultice may be,—two parts castor-oil, with one part balsam of Peru, spread on pieces of lint; or carbolic oil, or a few drops of carbolic acid, or of turpentine, in the poultice.

(7.) *During convalescence* the diet is to be carefully regulated so as not to exceed. Ale or porter, rather than wine or spirits, may be given, if necessary; the bowels must be kept open by laxatives or enemata, and mineral acids in bitter infusions, with iron, quinine, or both, are most useful tonics, especially combined with change of residence and open-air exercise.

II.—*Treatment as regards Inflammation.*

Antiphlogistic treatment is the technical expression which indicates the management of cases of inflammation—and comprehends rest, regimen, diet, with such remedies as have for their object the lowering of the increased vascular action in the inflamed part, and subduing the general or inflammatory fever. As to the febrile state, the principles on which it is to be managed, as regards food and drink and hygienic arrangements, have been indicated in the previous pages. But in cases where inflammation affects the organs of respiration, the temperature of the air in which the patient breathes should not be less than 70° to 80° Fahr., and as pure as possible—the air being rendered moist by steam, if necessary.

The antiphlogistic remedies are blood-letting, purgatives, diaphoretics, diuretics, antimonials, mercurials, iodide of potassium, opium, aconite, digitalis, alkalies, and salines.

The practice of general blood-letting has ceased to be the routine remedy it once was; but there are reasons for believing that venesection is now less valued, because the younger medical men of the day have never, as students, had opportunities of seeing its usefulness. The class of patients in the hospitals of medical schools in large towns are not usually of the plethoric or *sthenic* constitution, which tolerate and require venesection. It is in country life rather than in town life, amongst the well fed and plethoric, and not amongst the poor, the starved, and anæmic, that cases occur where venesection is required. The younger medical men have been taught to do without its aid, and now declaim against the practice of venesection, as they may have heard their teachers do; and so, because they do not know its merits, they ignore its usefulness. But just as the administration of alcohol in disease has been used to excess, so the practice of venesection has also at times greatly exceeded its necessity; and as the cases requiring alcohol are now better understood, and certain rules for its administration can be clearly defined (see p. 75, *ante*; also *Science and Practice of Medicine*), so the cases suitable for venesection are also capable of being indicated, and rules laid down for its practice. There are assuredly certain cases in which life may be sacrificed by adopting less active measures than venesection. These are especially certain cases of inflammation of the pleuræ, of the peritoneum, and meninges of the nervous system; grave cases of inflammation of the lungs; cases of apoplexy from slow hæmorrhage, with marked plethora; and cases of the so-called ardent fever of the Tropics.

The tissue or organ affected, the condition of the patient as to age, constitution, and general health, the nature of the inflammation, and the stage to which the process has reached, are the special points for investigation in deciding as to the propriety of venesection. Every case must be judged upon its merits. The assemblage and succession of symptoms in each case must be taken together; and no single indication is to be relied upon, every one being important in itself, and every one having a relative value.

The following may be regarded as conditions justifying venesection:—

(1.) Cases of extensive acute inflammation of any of the solid organs or serous members in young and plethoric persons, otherwise healthy, in whom fever is severe and of the *inflammatory* or *sthenic type* (see p. 65, *ante*), the pulse having the characters indicated under that type of fever.

(2.) In cases of thoracic inflammation when dyspnœa is urgent, even to orthopnœa, with a swollen flushed face, a frequent and violent cough (with scanty or true pneumonic expectoration) aggravating pain extending through or over the chest, if the case is seen within three days of commencement of the illness, presumably prior to fibrinous effusions, the accumulation of inflammatory products or new material of growth damaging and destroying the inflamed textures.

The object and efficacy of blood-letting in such cases is to lessen the extent and the intensity of the inflammation, which it accomplishes—*first*, by weakening or lessening the force of the heart's action; and *second*, by causing a derivation of blood from the inflamed part. This derivative effect has been seen to take place in experiments upon the transparent parts of animals. In accomplishing these two results general blood-letting diminishes the quantity of living matter in which the peculiar changes comprised under *inflammation* are going on. It also tends to promote the absorption of fluid products, and so also to promote the action of remedies taken in by absorption. It also tends to modify the severity of inflammation—(1) by limiting the sphere of the lesion; (2.) by diminishing the general plethora of blood from which the inflamed part is nourished; (3.) by promoting reabsorption. It lowers temperature from 1° to 5° or 6° Fahr. in a few hours; it diminishes the arterial tension by facilitating the peripheric circulation; it diminishes the pulse from 10 to 20 beats per minute; so that, if practised at the beginning of an acute inflammation (other than that which occurs in a putrid or septic disease), it cannot fail to arrest its progress in a way no other remedy can.

Blood-letting is injurious, and ought never to be practised in cases of debility, of degeneration of tissues, of low types of fever (See *ante*, p. 65), or when inflammation is associated with, or when it may be the result of, a specific morbid poison; and therefore in epidemic fevers it is not to be thought of, or in any putrid or septic disease.

Antiphlogistic medicinal agents are represented by *purgatives* usually of a drastic nature at first, in sthenic inflammations especially—the resinous cathartics are especially of use for this purpose, such as *jalap*, *scammony*, and *gamboge*—afterwards, as salines and alteratives, maintaining a gentle evacuant action. The saline remedies also act as cooling agents, promoters of perspiration, and as diuretics. All these exert a beneficial action on the blood by promoting elimination of the products of the metamorphoses of tissues. The simplest forms of *diuretics* are—*nitrate of potass*, *bitartrate of potass*, *sweet spirits of nitre*, *acid* and *alkaline drinks*. Of *saline* remedies the simplest are the *carbonate of potass* and *of soda*, *sulphate of soda*, *tartrate of potass* and *soda*, *bitartrate of potass*. *Aconite*, *digitalis*, and *veratrium veride* are powerful antiphlogistic agents, each of them lowering the heart's action, and slowing the circulation. In these respects they are powerful sedatives; and their administration requires great care and watchfulness.

Colchicum has also a sedative effect on the circulation, and increases the flow from liver, kidneys, and mucous membrane of the intestines.

Antimony, in the form of *tartar emetic*, has long had the reputation of a most valuable antiphlogistic. It tends to increase all the secretions, especially those from the skin and lungs. Much can be done with antimony, according to its dose. A *sixth* or an *eighth* of a grain in a watery solution, repeated every two or three hours, will generally induce diaphoresis, thereby tending to subdue the intense heat of skin which is so characteristic of the fever of inflammation. A *quarter* of a grain similarly repeated will add nausea to diaphoresis, and thus increase the sedative effect on the circulation.

Opium is another most valuable antiphlogistic, when combined with *antimony* or *ipecacuanha*, where pain has to be relieved and vascular excitement subdued.

Iodide of potassium is another valuable remedy, especially in glandular inflammation. It may be combined with carbonate of ammonia.

Mercury.—Much diversity of opinion still exists as to the efficacy of this medicine as a remedy in inflammation. As a purgative, combined with jalap it is most efficient in causing a copious exhalation from the mucous glands of the intestine, promoting a flow of bile, and tending to lower temperature. It is as an agent for removing, by promoting absorption of products, the immediate results of inflammation, that its position as a remedy is still doubted, so much so that some say it ought to be avoided, or at least used with great caution. As an "*alterative*" its effects on certain textures are obvious, as in the *choroid* and in *iritis* and inflammation of the deep-seated parts of the eye; and in other inflammations, especially of the serous membranes—the pleuræ and peritoneum—so long as the inflammation is not due to putrid or septic sources. It is of special value in the specific inflammation of syphilis, when indurations exist, and then it ought always to be combined with nourishing diet and tonic remedies, if it is to be given for a lengthened period.

Reverting to varieties of inflammation, noticed at pages 36 to 38, there are especially three for which remedies held to be more or less specific are usually given—namely, rheumatic inflammation, for which *alkalies* are useful; *gout*, requiring *colchicum;* syphilitic indurations, *mercury;* and syphilitic ulcerations, *iodide of potassium.*

The *local treatment* of inflammations necessitates—(*a.*) rest of the inflamed part, (*b.*) position of the body favourable to the ease and rest of the part or organ affected, (*c.*) counter-irritant applications, such as blisters, iodine solution, oleate of mercury, mercurial ointments, issues, setons, or even the actual cautery.

In the treatment of asthenic inflammations there is no tolerance of the true antiphlogistic remedies. The main indication is to counteract the tendency to depression, the debility of the system, and the depraved condition of the blood that prevails.

Diet must be as nourishing and as abundant as is compatible with digestion, and stimulants are generally required. Tonics, such as iron and quinine, must be given, and sometimes opiates, to allay irritation and secure sleep.

OUTLINES

OF

THE SCIENCE AND PRACTICE OF MEDICINE.

PART II.

METHODICAL NOSOLOGY, SYSTEMATIC MEDICINE, OR THE DISTINCTIONS AND DEFINITIONS, THE NOMENCLATURE AND CLASSIFICATION OF DISEASES.

CHAPTER I.

THE AIM AND OBJECTS OF METHODICAL NOSOLOGY.

THE scope of this chapter is to state the principles on which particular diseases are *defined*, *named*, and *classified*.

In a progressive science like medicine, definitions of particular diseases can only be provisional. The present state of medical science will not tolerate hard and fast lines of definition; and the best definitions of diseases "can only incompletely circumscribe their subject, and must have shadowy outlines." Hence, in the following pages, the description of each disease, embracing its natural history, will usually define it sufficiently to distinguish each disease from all others. (For more formal definitions, see *Science and Practice of Medicine*, by the Author.)

As to the nomenclature of disease, it appears, from the history of medicine, that the names of diseases must change as our knowledge of them changes and becomes more precise. Hence the College of Physicians of London recommend a revision of their nomenclature every ten years.

The nomenclature and classification published by the London College I have published in the larger Text-Book. It is also followed here, as it is now required to be used in all the Public Services in compiling the Medical Statistics.

The classification of diseases has for its object the arrangement of named diseases in more or less comprehensive groups. Many systems of nosology have been adopted from time to time; but as the grounds on which diseases have been classified are too extensive to be given in this compendium, the reader is referred for full details to my larger Text-Book.

The important task of devising a "provisional nomenclature and definition of diseases" consistent with the progress of medical science, engaged the attention of a committee of the Royal College of Physicians of London during the ten years from 1857 to 1867; and after many interruptions and much consideration, the committee at last completed their work, which was unanimously adopted by the College.

The plan of this nomenclature is, first, "*to give an English name to the disease, employing the terms in popular use whenever they are not absolutely inaccurate; and to use only one word, or as few words as possible, in* NAMING *a disease.*" Definitions were attached to the English names in certain instances only—namely, in cases where there might be some ambiguity as to the signification which the College desired to attach to them. These definitions were thus framed for the purpose of identification, and not as explanations of the phenomena of disease.

The classification of diseases is based on anatomical considerations, on this principle,—that GENERAL DISEASES are such as affect the whole frame, and are subdivided into two sections, designated respectively SECTION A and SECTION B; LOCAL DISEASES embrace those lesions which affect the several organs of the body.

Of GENERAL DISEASES, SECTION A comprehends those disorders which appear to involve a morbid state of the blood, and which present, for the most part, but not all of them, the following characters:—They run a definite course, are attended with fever, and frequently with eruptions on the skin—are more or less readily communicable from person to person, and possess the singular and important property of generally protecting those who suffer them from a second attack. They are apt to occur epidemically. Some of the so-called *zymotic diseases* of Dr. Farr are comprehended in this section.

SECTION B comprises, for the most part, disorders which are apt to invade different parts of the same body simultaneously or in succession. These are sometimes spoken of as *constitutional diseases*, and they often manifest a tendency to transmission by inheritance. Some of the *constitutional diseases* of Dr. Farr are comprehended in this section.

CHAPTER II.

"THE NOMENCLATURE OF DISEASES" DRAWN UP BY A JOINT COMMITTEE APPOINTED BY THE ROYAL COLLEGE OF PHYSICIANS OF LONDON (1869).

GENERAL DISEASES.

A.

1. Small-pox.
   Group A (unmodified).
   Group B (modified).
   Varieties, applicable to both groups:
      a. Confluent.
      b. Semi-confluent.
      c. Distinct. *Syn.* Discrete.
      d. Abortive. *Syn.* Varicelloid.
   Subordinate Varieties:
      e. Petechial.
      f Hæmorrhagic.
      g. Corymbose.
2. Cow-pox.
3. Chicken-pox.
4. Measles.
5. Scarlet fever. *Syn.* Scarlatina.
   Varieties:
      a. Simple.
      b. Anginose.
      c. Malignant.
6. Dengue.
7. Typhus fever.
8. Cerebro-spinal fever. *Syn.* Malignant purpuric fever; Epidemic cerebro-spinal meningitis.
9. Enteric fever. *Syn.* Typhoid fever; and in children is often named Infantile remittent fever.
10. Relapsing fever.
11. Simple continued fever.
12. Febricula.
13. Yellow fever.
14. Plague.
15. Ague. *Syn.* Intermittent fever.
   Varieties:
      a. Quotidian.
      b. Tertian.
      Sub-variety:
         Double tertian.
      c. Quartan.
      Sub-variety:
         Double quartan.
      d. Irregular.

(10lb.) *Brow Ague.*

16. Remittent fever.
17. Simple cholera.
18. Malignant cholera. *Syn.* Serous cholera; Spasmodic cholera; Asiatic cholera.
      a. Choleraic diarrhœa.
19. Diphtheria.
      a. Diphtheric paralysis.
20. Hooping-cough.
21. Mumps.
22. Influenza.
23. Glanders.
24. Farcy.
25. Equinia mitis. *Syn.* Grease.
26. Malignant pustule.
27. Phagedæna.
28. Sloughing phagedæna.
29. Hospital gangrene.
30. Erysipelas.
   Varieties:
      a. Simple. *Syn.* Cutaneous.
      b. Phlegmonous. *Syn.* Cellulo-cutaneous.
      c. Diffuse inflammation (of cellular tissue).
31. Pyæmia.
32. Puerperal fever.
33. Puerperal ephemera. *Syn.* Weed.

B.

34. Acute rheumatism. *Syn.* Rheumatic fever.
      a. Sub-acute rheumatism.
35. Gonorrhœal rheumatism.
36. Synovial rheumatism
37. Muscular rheumatism.
   Local varieties:
      a. Lumbago.
      b. Stiff neck.
38. Chronic rheumatism.
39. Acute gout.
40. Chronic gout.
41. Gouty synovitis.
42. Chronic osteo-arthritis. *Syn.* Chronic rheumatic arthritis.
43. Syphilis.
      A. Primary syphilis.
      Varieties:
         Hard chancre.
            Indurated bubo.
         Soft chancre.
            Suppurating bubo.
         Phagedænic sore.
         Sloughing sore.
      B. Secondary syphilis.
      C. Hereditary syphilis.
   1. Local syphilitic affections.
44. Cancer. *Syn.* Malignant disease.
   Varieties:
      a. Scirrhus. *Syn.* Hard cancer.
      b. Medullary cancer. *Syn.* Soft cancer
      c. Epithelial cancer. *Syn.* Cancroid epithelioma.
      d. Melanotic cancer. *Syn.* Melanosis.
      e. Osteoid cancer.
   1. Local cancer.
45. Colloid. *Syn.* Colloid cancer; Alveolar cancer.
   1. Local colloid.

ARRANGEMENT OF NON-MALIGNANT TUMORS AND CYSTS.

Fibrous tumor.
Fibro-cellular tumors.

- Fibro-nucleated tumor.
- Fibro-plastic tumor.
- Myeloid tumor.
- Fatty tumor. *Syn.* Lipoma.
- Osseous tumor.
  - *a.* Of bone. *Syn.* Exostosis.
    - *Varieties:*
      - 1. Ivory.
      - 2. Cancellated.
      - 3. Diffused.
  - *b.* Of the soft parts.
- Cartilaginous tumor. *Syn.* Enchondroma.
  - Fibro-cartilaginous tumor.
- Glandular tumor. *Syn.* Adenocele.
- Vascular tumor.
- Nævus.
- Sebaceous tumor.
  - Cholesteatoma.
- Molluscum.
- Warty tumor and warts.
- Condyloma.
- Cheloid.
- Villous tumor.
- Simple or barren cysts.
  - *a.* Serous.
  - *b.* Synovial. *Syn.* Bursal.
  - *c.* Mucous.
  - *d.* Suppurating.
  - *e.* Sanguineous.
  - *f.* Hæmorrhagic.
  - *g.* Aneurismal.
  - *h.* Oily.
  - *i.* Colloid or gelatinous
  - *j.* Seminal.
- Compound or proliferous cysts.
  - *a.* Complex cystic tumor. *Syn* Cystosarcoma.
    - 1. With intracystic growths.
  - *b.* Cutaneous or piliferous cyst. *Syn.* Dermoid.
  - *c.* Dentigerous cyst.
- 46. Lupus.
  - *Varieties:*
    - *a.* Chronic lupus.
    - *b* Lupus excedens.
- 47. Rodent ulcer.
- 48. True leprosy. *Syn.* Elephantiasis Græcorum.
- 49. Scrofula.
  - *Varieties:*
    - *a.* Scrofula with tubercle.
    - *b.* Scrofula without tubercle.
  - 1. Local scrofulous affections.
    - Tubercular meningitis.
    - Scrofulous ophthalmia.
    - Tubercular pericarditis.
    - Scrofulous disease of glands.
    - Phthisis pulmonalis.
    - Hæmoptysis.
    - Acute miliary tuberculosis.
    - Tabes mesenterica.
    - Tubercular peritonitis.
- 50. Rickets.
- 51. Cretinism.
  - *Varieties:*
    - *a.* Complete cretinism. *Syn.* Incurable cretinism.
    - *b.* Incomplete cretinism. *Syn.* Curable cretinism.
- 52. Diabetes. *Syn.* Diabetes mellitus.
- (935*a.*) *Ergotism.*
- 53. Purpura.
  - *Varieties:*
    - *a.* Simple.
    - *b.* Hæmorrhagic.
- 54. Scurvy.
- 55. Anæmia.
- 56. Chlorosis. *Syn.* Green sickness.
- 57. General dropsy.
- 58. Beri-Beri.

DISEASES OF THE NERVOUS SYSTEM.

Diseases of the Brain and its Membranes.

- 59. Encephalitis.
- 60. Meningitis.
  - 1. Inflammation of the dura mater.
  - 2. Inflammation of the pia mater and arachnoid.
  - (49.) 3. *Tubercular meningitis.* Syn. *Acute hydrocephalus.*
- (8.) *Cerebro-spinal fever.*
- 61. Inflammation of the brain.
- 62. Red softening (of the brain).
- 63. Yellow softening (of the brain).
- 64. Abscess (of the brain).
- 65. Apoplexy.
  - *Varieties:*
    - *a.* Congestive.
    - *b.* Sanguineous. *Syn.* Cerebral hæmorrhage.
- 66. Sunstroke.
- 67. Chronic hydrocephalus.
- 68. Hypertrophy (of the brain).
- 69. Atrophy (of the brain.)
- 70. White softening (of the brain). *Syn.* Atrophic softening.
- (43.) *Syphilitic disease.*
- (44.) *Cancer.*
- 71. Fibrous tumor.
- 72. Osseous tumor.
- (49.) *Tubercular deposit.*
  - *a. Miliary* or *granular tubercle*
  - *b. Yellow tubercle.*
- 73. Parasitic disease.
- 73*. Malformations.
- 74. Diseases of the cerebral arteries.
  - *a.* Fatty and calcareous degeneration. *Syn.* Atheroma, Ossification.
  - *b.* Aneurism.
  - *c.* Impaction of coagula.
    - 1. Thrombosis (Local coagulation).
    - 2. Embolism (Coagula conveyed from a distance).

Diseases of the Spinal Cord and its Membranes.

- 75. Inflammation.
  - *Varieties:*
    - *a.* Spinal meningitis.
    - *b.* Myelitis.
- 76. Hæmorrhage (Spinal). *Syn.* Spinal apoplexy.
- 77. Atrophy (Spinal). *Syn.* Tabes dorsalis.
- 78. White softening (of the Spinal cord).
- (44.) *Cancer.*
- 79. Non-malignant tumors.
- 80. Malformations.
  - *a.* Spina bifida.

Diseases of the Nerves.

- 81. Inflammation.
- 82. Atrophy.
- (44.) *Cancer.*
- 83. Neuroma.
- 84. Paralysis.

(108.) 1. *Paralysis of the insane.* Syn. *General paralysis.*
85. 2. Hemiplegia.
86. 3. Paraplegia.
87. 4. Locomotor ataxy.
(797.) 5. *Progressive muscular atrophy.*
88. 6. Infantile paralysis.
89. 7. Local paralysis.
  a. Facial paralysis.
  b. Scrivener's palsy.
(19a.) 8. *Diphtheritic paralysis.*
(908b.) 9. *Lead palsy.*
(966a.) 10. *Paralysis from Lathyrus.*

Functional Diseases of the Nervous System.

90. Tetanus.
91. Hydrophobia.
92. Infantile convulsions.
93. Epilepsy.
  a. Epileptic vertigo. *Syn.* Petit mal.
94. Convulsions.
95. Spasm of muscle.
96. Laryngismus stridulus. *Syn.* Spasm of the glottis, Spasmodic croup, Child-crowing.
97. Shaking palsy.
(907a.) *Mercurial tremor.*
98. Chorea. *Syn.* St. Vitus's dance.
  a. Acute.
  b. Chronic.
99. Hysteria.
100. Catalepsy.
(243.) *Syncope.*
101. Neuralgia.
  Principal Varieties:
  a. Facial. *Syn.* Tic douloureux.
  b. Brow ague. *Syn.* Hemicrania.
  c. Sciatica.
  d. Pleurodynia.
  e. Irritable stump.
102. Hyperæsthesia.
103. Anæsthesia.
(938a.) *Delirium tremens.*
104. Hypochondriasis.

Disorders of the Intellect.

105. Mania.
  a. Acute mania.
  b. Chronic mania.
106. Melancholia.
107. Dementia.
  a. Acute dementia.
  b. Chronic dementia.
108. Paralysis of the insane. *Syn.* General paralysis.
109. Idiotcy (Congenital).
110. Imbecility (Congenital).

DISEASES OF THE EYE.

Diseases of the Conjunctiva.

111. Conjunctivitis. *Syn.* Ophthalmia.
112. Catarrhal ophthalmia.
113. Pustular ophthalmia.
114. Purulent ophthalmia.
115. Purulent ophthalmia of infants. *Syn.* Ophthalmia neonatorum.
(491.) *Scrofulous ophthalmia.* Syn. *Strumous ophthalmia.*
116. Exanthematous ophthalmia.
117. Gonorrhœal ophthalmia.
118. Chronic ophthalmia.
119. Œdema of the sub-conjunctival tissue. *Syn.* Chemosis.
120. Pinguecula.
121. Pterygium.
122. Fatty tumor.
123. Parasitic disease.
124. Metallic stains.
  a. From nitrate of silver.
  b. From lead.

Diseases of the Cornea.

125. Keratitis.
126. Chronic interstitial keratitis.
127. Keratitis with suppuration. *Syn.* Onyx.
128. Ulcer.
129. Opacity. *Syn.* Leucoma.
130. Conical cornea.
131. Arcus senilis.
132. Staphyloma.
133. Parasitic disease in the anterior chamber.

Diseases of the Sclerotic.

134. Sclerotitis.
135. Staphyloma.

Diseases of the Iris.

136. Iritis.
137. Traumatic iritis.
138. Rheumatic iritis.
139. Arthritic iritis.
(431.) *Syphilitic iritis.*
(491.) *Scrofulous iritis.*
140. Gonorrhœal iritis.
141. Sequelæ of iritis.
142. Malformations.

Diseases of the Choroid and Retina.

143. Choroiditis.
144. Retinitis.
145. Choroidal apoplexy.
146. Amaurosis.
147. Impaired vision.
148. Muscæ volitantes.
149. Albinism.

Diseases of the Vitreous Body.

150. Synchysis.
151. Various morbid deposits.

Diseases of the Lens and its Capsule.

152. Cataract.
  Varieties:
  a. Hard.
  b. Soft.
  c. Fluid.
153. Parasitic disease.
154. Malformations.
  a. Congenital cataract.
155. Traumatic cataract.

General Affections of the Eye.

156. Glaucoma.
157. Hydrophthalmia.
(441.) *Cancer.*
(491.) *Scrofulous deposit within the eyeball.*
158. Total disorganisation of the eye from injury.
158*. Malformations.

Various Defects of Sight.

159. Short sight.
160. Long sight.

161. Faulty perception of colours.
  Syn. Colour blindness.
162. Hemeralopia.
163. Nyctalopia.
164. Astigmatism.

DISEASES OF THE LACHRYMAL APPARATUS.

165. Lachrymal obstruction.
166. Abscess and fistula.
167. Dacryolith.
168. Diseases of the lachrymal gland and its ducts.

DISEASES OF THE EYELIDS.

169. Inflammation.
170. Hordeolum.
171. Abscess in the Meibomian glands.
172. Epicanthis.
173. Entropium.
174. Ectropium.
175. Trichiasis.
176. Madarosis. *Syn.*, Loss of the eyelashes
177. Tarsal ophthalmia.
178. Blepharospasmus.
(44.) *Cancer.*
179. Cyst of the lids.
(895.) *Phthiriasis.*
179*. Malformations.

DISEASES WITHIN THE ORBITS.

180. Abscess in the orbit.
181. Strabismus.
182. Protrusion of the eyeball. *Syn.* Proptosis.
(282.) *Exophthalmic bronchocele.*
(250.) *Orbital aneurism.*
(44.) *Cancer.*
183. Non-malignant tumors.
184. Parasitic disease.
185. Affections of the orbital nerves.

DISEASES OF THE EAR.

DISEASES OF THE AURICLE.

186. Gouty and other deposits.
187. Hæmatoma auris.
(44.) *Cancer.*
188. Non-malignant tumors.
(827, &c.) *Cutaneous affections.*
189. Malformations.
(1012.) *Injuries.*

DISEASES OF THE EXTERNAL MEATUS.

190. Inflammation.
  a. Acute.
  b. Chronic.
191. Abscess.
192. Accumulation of wax.
193. Polypus.
194. Sebaceous tumor. *Syn.* Molluscous tumor.
195. Osseous tumor of bone. *Syn.* Exostosis.
195*. Malformations.
(1014.) *Foreign bodies.*

DISEASES OF THE MEMBRANA TYMPANI.

196. Inflammation.
197. Ulceration.
198. Perforation.
(1012.) *Injuries.*

DISEASE OF THE EUSTACHIAN TUBE.

199. Obstruction.

DISEASES OF THE TYMPANUM.

200. Disease of the mucous membrane.
201. Disease of the ossicles.
202. Disease of the mastoid cells.

DISEASES OF THE INTERNAL EAR.

203. Organic disease.
204. Necrosis of the petrous bone.
205. Deafness.
  Varieties:
    a. Functional or nervous.
    b. From disease.
    c. Deaf-dumbness.
(44.) *Cancer.*
205*. Malformations.

DISEASES OF THE NOSE.

206. Hypertrophy. *Syn.* Lipoma.
207. Wart.
208. Sebaceous cyst.
(44.) *Cancer of the Skin.*
(46.) *Lupus.*
209. Ozæna.
210. Ulceration of the pituitary membrane.
211. Abscess of the septum.
212. Perforation of the septum.
213. Epistaxis.
214. Hypertrophy of the pituitary membrane.
(44.) *Cancer.* Syn. *Malignant polypus.*
215. Polypus nasi.
  Varieties:
    a. Gelatinous.
    b. Fibrous.
    1. Naso-pharyngeal polypus.
216. Non-malignant tumors of the septum.
217. Rhinoliths.
217.* Malformations.
(1015.) *Foreign bodies.*
218. Loss or perversion of the sense of smell.

DISEASES OF THE CIRCULATORY SYSTEM.

DISEASES OF THE HEART AND ITS MEMBRANES

DISEASES OF THE PERICARDIUM.

219. Pericarditis.
220. Suppurative pericarditis.
(49.) *Tubercular pericarditis.*
221. Adherent pericardium.
222. Dropsy.
(44.) *Cancer.*
223. Malformations.
(1056.) *Injuries.*

DISEASES OF THE ENDOCARDIUM.

224. Endocarditis.
225. Valve-disease.
  1. Aortic.
  2. Mitral.
  3. Pulmonic.
  4. Tricuspid.
    Varieties:
      a. Vegetations.
      b. Fibroid thickening.

c. Fatty and calcareous degeneration. *Syn.* Atheroma, Ossification.
d. Aneurism.
e. Laceration.
f. Simple dilatation of orifice.]
g. Malformations.
Obstruction to the circulation and
Regurgitation should be specially noted when they accompany the valve-disease.

226. Fibrinous concretions in the cavities of the heart.

DISEASES OF THE MUSCULAR STRUCTURE OF THE HEART.

227. Myocarditis.
228. Abscess.
229. Hypertrophy.
  a. Of left side.
  b. Of right side.
230. Dilatation.
  a. Of left side.
  b. Of right side.
231. Atrophy.
232. Excess of fat.
233. Fatty degeneration.
234. Fibroid degeneration.
235. Aneurism.
236. Acute aneurism.
237. Rupture.
(44.) *Cancer.*
238. Parasitic disease.
239. Disease of the coronary arteries.
240. Malformations.
241. Cyanosis.
(1056-58.) *Injuries of the heart.*
242. Angina pectoris.
243. Syncope. *Syn.* Fainting fit.
244. Palpitation and irregularity of the action of the heart.

Diseases of the Blood-Vessels.

DISEASES OF THE ARTERIES.

245. Arteritis.
246. Fatty and calcareous degeneration. *Syn.* Atheroma, Ossification.
247. Narrowing and obliteration.
248. Occlusion.
  a. From compression.
  b. From impaction of coagula.
    1. Thrombosis (local coagulation).
    2. Embolism (coagula conveyed from a distance).
249. Dilatation.
250. Aneurism.
In returning such cases, state whether the aneurism be—
  a. Fusiform,
  b. Saccular, or
  c. Diffused (sac formed by the surrounding tissues).
251. Rupture of artery.
  a. From disease of artery.
  b. From disease external to artery.
252. Partial rupture of artery. *Syn.* Dissecting aneurism.
253. Traumatic aneurism.
254. Arterio-venous aneurism.
255. Aneurismal varix.
Varieties:
  a. Traumatic.
  b. Spontaneous.
256. Varicose aneurism.
Varieties:
  a. Traumatic.
  b. Spontaneous.
257. Cirsoid aneurism. *Syn.* Arterial varix.
258. Aneurism by anastomosis.
259. Malformations.
  a. Commencement of the descending aorta (contracted or obliterated).
(1009, &c.) *Injuries of arteries.*
  Contusion.
  Laceration.
    a. *Of the whole vessel.*
    b. *Of the outer coat.*
    c. *Of the inner coat.*
  Wound.

DISEASES OF THE VEINS.

260. Phlebitis.
Varieties:
  a. Adhesive.
  b. Suppurative.
261. Phlegmasia dolens.
262. Fibrinous concretions in the veins.
263. Obstruction.
264. Obliteration.
265. Phlebolithes.
266. Varicose veins.
267. Nævus vascularis.
268. Parasitic disease.
(1009, &c.) *Injuries of veins,*
  Rupture, without external wound.
  Wound of vein, with entrance of air.

DISEASES OF THE ABSORBENT SYSTEM.

269. Inflammation of lymphatics.
270. Suppuration of lymphatics.
271. Inflammation of glands.
272. Suppuration of glands.
273. Hypertrophy of glands.
  a. Chronic enlargement of glands.
274. Atrophy of glands.
275. Lymphatic fistula.
(1142.) *Foreign bodies and concretions.*
276. Obstruction of the thoracic duct.
277. Obstruction, obliteration, and varicosity of lymphatics.
278. Bursting of lymphatics.
(43.) *Syphilitic bubo.*
(43.) *Syphilitic inflammation of glands.*
(44.) *Cancer.*
(49.) *Scrofulous disease of glands.*
(49.) *Suppuration.*
(1143.) *Wound of lymphatics.*

Diseases of the Bronchial Glands.

(340.) *Inflammation.*
(341.) *Abscess.*
(342.) *Enlargement.*
(44.) *Cancer.*
(343.) *Non-malignant tumors.*
(49.) *Tubercle.*

DISEASES OF THE DUCTLESS GLANDS.

Diseases of the Thyroid Gland.

279. Inflammation.
  a. Acute.
  b. Chronic.

280. Goitre.
281. Cyst.
282. Exophthalmic bronchocele.
283. Pulsating bronchocele.
(44.) *Cancer.*

Diseases of the Thymus Gland.

284. Hypertrophy.
(44.) *Cancer.*
285. Non-malignant tumors.

Diseases of the Supra-renal Capsules.

(44.) *Cancer.*
(49.) *Tubercular degeneration.*
286. Addison's disease. *Syn.* Bronzed skin Melasma Addisoni.

DISEASES OF THE RESPIRATORY SYSTEM.

Diseases of the Respiratory System not Strictly Local.

287. Hay asthma.
(22.) *Influenza.*
(20.) *Hooping-cough.*
288. Croup.
(19.) *Diphtheria.*
(995.) *Asphyxia.*

Disease of the Nostrils.

289. Coryza. *Syn.* Nasal catarrh.

Diseases of the Larynx.

290. Inflammation of the epiglottis.
291. Ulceration of the epiglottis.
292. Laryngeal catarrh.
293. Laryngitis.
    a. Acute.
    b. Chronic.
294. Ulcer.
295. Abscess.
296. Œdema of the glottis.
297. Necrosis of cartilage.
298. Contraction.
(44^{c}.) *Epithelial cancer.*
299. Warty growth.
300. Polypus.
301. Cyst.
301*. Malformations.
(992–1039.) *Injuries.*
(1044.) *Foreign bodies in the larynx.*
302. Aphonia.
303. Paralysis of the glottis.
304 Spasm of the glottis.
(96.) *Laryngismus stridulus.*

Diseases of the Trachea and Bronchi.

305. Bronchial catarrh.
306. Bronchitis.
    a. Acute.
    b. Chronic.
307. Ulcer.
308. Casts of the bronchial tubes.
309. Necrosis of the cartilages of the trachea.
310. Dilatation.
311. Contraction.
(44.) *Cancer.*
312. Non-malignant tumors.
(49.) *Tubercle.*
313. Parasitic disease.
313. Malformations.
(1044) *Foreign bodies in the bronchi.*
314. Asthma.

Diseases of the Lung.

315. Pneumonia.
    Variety:
    a. Lobular
316. Abscess
(31.) *Pyæmic inflammation and abscess.*
317. Gangrene.
318. Passive congestion.
    a. Hæmoptysis.
319. Pulmonary extravasation. *Syn.* Pulmonary apoplexy.
    a. Hæmoptysis.
320. Œdema.
321. Cirrhosis.
322. Emphysema.
    a. Vesicular.
    b. Interlobular.
323. Atelectasis.
324. Collapse.
(43.) *Syphilitic deposit.*
(44.) *Cancer.*
(49.) Phthisis.
(49.) *Acute miliary tuberculosis.*
325. Acute pneumonic phthisis.
326. Chronic pneumonic phthisis.
327. Parasitic disease.
327. Malformations.
(1054–1058.) *Injuries.*
(1044.) *Foreign bodies.*
328. Millstone makers' phthisis.
329. Grinders' asthma.
330. Miners' asthma.

Diseases of the Pleura.

331. Pleurisy.
332. Chronic pleurisy.
333. Empyema.
334. Adhesion, including thickening and ossification.
335. Hydrothorax.
336. Pneumothorax.
(41.) *Cancer.*
337. Non-malignant tumors.
(49.) *Tubercular pleurisy.*
(1053–1054.) *Injuries.*

Diseases of the Mediastinum.

338. Abscess.
(44.) *Cancer.*
339. Non-malignant tumors.
(284-285.) *Diseases of the thymus gland*

Diseases of the Bronchial Glands.

340. Inflammation.
341. Abscess.
342. Enlargement.
(44.) *Cancer.*
343. Non-malignant tumors.
(49.) *Tubercle.*

DISEASES OF THE DIGESTIVE SYSTEM.

Diseases of the Lips.

The affected lip ought to be specified.

344. Ulcer.
(43) *Syphilitic ulcer.*
345. Fissures.
(44.) *Cancer.*
(59.) *Scrofulous hypertrophy.*

346. Cyst.
347. Malformations.
    a. Hare-lip.

Diseases of the Mouth.

348. Stomatitis.
349. Ulcerative stomatitis.
350. Thrush. *Syn.* Aphtha, Vesicular stomatitis.
351. Abscess of the cheek.
353. Cancrum oris. *Syn.* Gangrenous stomatitis.
354. Cyst of the cheek.
355. Ranula.
(44.) *Cancer.*
356. Parasitic disease.
    a. Parasitic thrush. *Syn.* Parasitic aphthæ.

Diseases of the Jaws, including the Antrum.

357. Adhesion of the jaws by cicatrix.
358. Abscess of the antrum.
(44.) *Cancer.*
359. Fibrous tumor.
360. Myeloid tumor.
361. Osseous tumor.
    a. Hypertrophy of the bones of the face.
362. Cartilaginous tumor.
363. Vascular tumor.
364. Cyst.
(1016.) *Foreign bodies in the antrum.*

Diseases, Malformations, and Injuries of the Teeth, Gums, and Alveoli.

365. Teething.

Diseases of the Dental Tissue.

366. Caries.
367. Necrosis.
368. Exostosis.
369. Absorption.

Diseases of the Dental Pulp.

370. Irritation.
371. Inflammation.
372. Ulceration.
373. Gangrene.

Diseases of the Dental Periosteum.

374. Granulation or polypus.
375. Calcification.
376. Inflammation.
377. Gum-boil.
378. Chronic thickening.
379. Rheumatic inflammation.

Diseases of the Gums.

380. Inflammation.
381. Ulceration.
382. Hypertrophy.
383. Atrophy.
384. Induration (in infancy).
(44.) *Cancer.*
385. Non-malignant tumors.
    a. Polypus.
    b. Cartilaginous tumor.
    c. Vascular tumor.
386. Epulis.

Diseases of the Alveoli.

387. Inflammation.
388. Necrosis.
389. Caries.
390. Exostosis.
391. Dentigerous cyst.
392. Absorption.

Specific Diseases affecting the Dental Periosteum, Gums, or Alveoli.

393. Mercurial Inflammation.
394. Phosphoric inflammation and necrosis.
(908c.) *Blue gum from lead.*
(54.) *Scurvy.*

Irregular Dentition.

Irregularity in the time of eruption of the—
395. Temporary teeth.
396. Permanent teeth.
Irregularity in the position of the—
397. Temporary Teeth.
398. Permanent Teeth.
Irregularity of the number of the—
399. Temporary Teeth.
400. Permanent Teeth.
Irregularity in the form of the—
401. Temporary Teeth.
402. Permanent Teeth.
Abnormal development of the—
403. Dental tissue.
404. Enamel.
405. Dentine.
406. Cementum.
407. Alveolar portions of the jaws, in size
408. Alveolar portions of the jaws, in form.
409. Defective growth of lower jaw.
410. Mechanical injuries of the alveoli and dental periosteum.
    a. Hæmorrhage.
    b. Fracture.
411. Mechanical injuries of the teeth.
    a. Fracture.
    b. Dilaceration.
    c. Dislocation.
    d. Friction.

Diseases of the Tongue.

412. Glossitis.
413. Ulcer.
414. Aphthous ulcer.
415. Abscess.
416. Hypertrophy.
(43A.) *Primary syphilis.*
(43B.) *Secondary syphilis.*
(44.) *Cancer.*
417. Vascular tumor.
418. Tongue-tie.
(89.) *Paralysis.*

Diseases of the Fauces and Palate.

419. Sore throat.
420. Relaxed throat.
421. Ulcerated throat.
422. Quinsy. *Syn.* Cynanche tonsillaris.
423. Tonsillitis.
424. Sloughing sore throat. *Syn.* Putrid sore throat. Cynanche maligna.
(19.) *Diphtheria.*
425. Enlarged tonsils.
(44.) *Cancer of the tonsils.*
(49.) *Scrofulous disease of the tonsils.*
426. Elongated uvula.
427. Perforation of the palate.
428. Stricture of the fauces.
(43.) *Syphilitic affection of the fauces and tonsils.*

(44.) *Cancer.*
429. Non-malignant tumor.
a. Fibro-cellular tumor.
b. Fibro-cystic tumor.
430. Malformations.
a. Cleft palate.

Diseases of the Pharynx.

431. Pharyngitis.
432. Ulcer.
a. Superficial ulcer.
b. Perforating ulcer.
433. Abscess.
434. Sloughing.
435. Adhesion of the soft palate.
436. Dilatation.
(43.) *Syphilitic affection.*
(44.) *Cancer.*
(1047.) *Injury by corrosive substances.*
(1045.) *Foreign bodies.*
(89.) *Paralysis.*

Diseases of the Salivary Glands.

437. Inflammation.
438. Salivation. *Syn.* Ptyalism.
439. Abscess.
440. Salivary fistula.
(21.) *Mumps.*
(44.) *Cancer.*
441. Non-malignant tumors.
442. Salivary calculus.

Diseases of the Œsophagus.

443. Œsophagitis.
444. Ulceration.
445. Perforation.
446. Stricture.
(44.) *Cancer.*
(1046.) *Foreign bodies.*
447. Malformations.
(107.) *Injury by corrosive substances.*
(89.) *Paralysis.*
448. Dysphagia.

Diseases of the Stomach.

449. Gastritis.
(906, &c.), a. *From irritant poisons.* (*For the list of poisons, see p.* 95.)
450. Chronic ulcer.
451. Hæmatemesis.
452. Perforation.
453. Dilatation.
454. Stricture.
455. Gastric fistula.
456. Hernia.
(44.) *Cancer.*
(45.) *Colloid.*
457. Non-malignant tumors.
458. Parasitic disease.
(1066-1071.) *Injuries.*
(1074.) *Foreign bodies.*
459. Spontaneous laceration.
460. Dyspepsia.
461. Gastrodynia.
462. Pyrosis.
463. Vomiting.

Diseases of the Intestines.

464. Enteritis.
465. Typhlitis.
466. Dysentery.
467. Ulceration.
468. Perforation.
469. Abscess in the sub-peritoneal tissue.
470. Fæcal abscess.
471. Fistula.
a. Fæcal fistula. *Syn.* Artificial anus.
(561.) *Vesico-intestinal fistula.*
472. Hæmorrhage.
473. Melæna.
474. Dilatation.
475. Tympanites.
476. Obstruction.
477. Stricture.
478. Intussusception.
479. Internal strangulation.
a. Mesenteric.
b. Mesocolic.
480. Hernia.
a. Reducible.
b. Irreducible.
c. Obstructed.
d. Inflamed.
e. Strangulated.
1. Diaphragmatic.
2. Epigastric.
3. Ventral.
4. Umbilical.
5. Lumbar.
6. Inguinal.
a. Oblique.
b. Direct.
c. Incomplete.
d. Scrotal.
e. Congenital.
f. Infantile.
7. Femoral.
8. Obturator.
9. Perineal.
10. Pudendal.
11. Vaginal.
12. Ischiatic.
481. Diseases of hernial sacs.
a. Inflammation.
b. Fibrinous effusion with closure
c. Suppuration.
d. Dropsy.
e. Movable bodies.
f. Laceration.
(44.) *Cancer.*
(45.) *Colloid.*
482. Non-malignant tumors.
a. Polypus.
483. Parasitic diseases.
(1075.) *Concretions.*
483*. Malformations.
(1075.) *Foreign bodies.*
(1066-1071.) *Injuries.*
484. Diarrhœa.
(17.) *Simple cholera.*
(18.) *Malignant cholera.*
a. *Choleraic diarrhœa.*
485. Paralysis.
486. *Colic.*
(908.) *Lead colic.*
487. Constipation.

Diseases of the Rectum and Anus.

488. Ulceration.
489. Abscess.
490. Fistula in ano.
(562.) *Recto-vesicle fistula.*
(600.) *Recto-urethral fistula.*
(676.) *Recto-vaginal fistula.*
491. Hæmorrhoids.
a. Internal.
b. External.
492. Hæmorrhage from the rectum.
493. Fissure of the anus.

494. Prolapsus.
495. Stricture.
(43.) *Syphilis of the rectum.*
496. Condyloma of the anus.
(44.) *Cancer of the rectum.*
(44.) *Cancer of the anus.*
497. Non-malignant tumors of the rectum.
497. Parasitic disease.
497. Malformations.
(1081-1082.) *Injuries.*
(1089.) *Foreign bodies in the rectum.*
498. Neuralgia.
499. Spasm of the sphincter ani.
500. Pruritus ani.

Diseases of the Liver.

501. Hepatitis.
502. Abscess.
(31.) *Pyæmic inflammation and abscess.*
503. Acute atrophy.
504. Simple enlargement. *Syn.* Congestion of the liver.
505. Thickening of the capsule.
506. Cirrhosis.
507. Fatty liver.
508. Fibroid deposit.
509. Lardaceous liver. *Syn.* Amyloid disease of the liver. Waxy liver.
(43.) *Syphilitic deposit.*
(44.) *Cancer.*
(45.) *Colloid.*
510. Non-malignant tumors.
511. Cyst.
(49.) *Tubercle.*
512. Parasitic disease.
512*. Malformations.
(1066-1071.) *Injuries.*
513. Jaundice. *Syn.* Icterus.
514. Obstruction of the vena portæ.

Diseases of the Hepatic Ducts and Gall Bladder.

515. Inflammation.
516. Ulcer.
517. Perforation.
a. Biliary fistula.
518. Obstruction.
(44.) *Cancer.*
519. Parasitic disease.
520. Gallstones.
a. Passage of gallstones through the duct.
520*. Malformations.
(1066-1071.) *Rupture.*

Diseases of the Pancreas.

521. Abscess.
522. Obstruction of the duct.
(44.) *Cancer.*
(45.) *Colloid.*
523. Calculi.

Diseases of the Spleen.

524. Splenitis.
525. Abscess.
(31.) *Pyæmic inflammation and abscess.*
526. Congestion. *Syn.* Ague cake.
527. Fibrinous deposit.
528. Hypertrophy.
a. Leucocythæmia.
529. Lardaceous spleen. *Syn.* Amyloid disease. Waxy spleen.
(44.) *Cancer.*
(45.) *Colloid.*
(49.) *Tubercle.*
530. Parasitic diseases.
(1066.) *Rupture.*

Diseases of the Peritoneum.

531. Peritonitis.
(719.) *a.* *Metro-peritonitis.* Syn. *Puerperal peritonitis.*
b. Chronic peritonitis.
c. Suppurative peritonitis.
(49.) *d.* *Tubercular peritonitis.*
e. Adhesions of the peritoneum.
532. Ascites.
532*. Non-malignant tumors.
(44.) *Cancer.*
(45.) *Colloid.*
533. Parasitic disease.
(1067-1070.) *Injuries.*

Diseases of the Mesenteric Glands.

534. Inflammation.
535. Abscess.
536. Enlargement.
(44.) *Cancer.*
537. Non-malignant tumors.
(49.) *Tubercle.*
(49.) *Tabes mesenterica.*

DISEASES OF THE URINARY SYSTEM.

Diseases of the Kidney.

538. Bright's disease. *Syn.* Albuminuria.
1. Acute Bright's disease. *Syn.* Acute albuminuria, Acute desquamative nephritis, Acute renal dropsy.
2. Chronic Bright's disease. *Syn.* Chronic albuminuria.
Subdivisions:
a. Granular kidney. *Syn.* Contracted granular kidney, Chronic desquamative nephritis, Gouty kidney.
b. Fatty kidney.
c. Lardaceous kidney. *Syn.* Amyloid disease. Waxy kidney.
539. Suppurative nephritis.
540. Abscess.
541. Pyelitis.
542. Fibrinous deposit.
543. Hydronephrosis.
544. Hypertrophy.
545. Atrophy.
(44.) *Cancer.*
546. Non-malignant tumors.
547. Simple cyst.
548. Urinary cyst (from injury).
(49.) *Tubercle.*
549. Parasitic disease.
550. Calculus.
551. Calculus in the ureter.
552. Malformations.
(1066-1071.) *Injuries.*
553. Hæmaturia renalis.
554. Suppression of urine. *Syn.* Ischuria renalis.
(52.) *Diabetes.* Syn. *Diabetes mellitus.*
555. Diuresis.
556. Movable kidney.

Diseases of the Bladder.

557. Cystitis. *Syn.* Catarrh of the bladder.

  a. Acute.
  b. Chronic.
558. Ulceration.
559. Suppuration.
560. Sloughing.
561. Vesico-intestinal fistula.
562. Recto-vesical fistula.
(660.) *Utero-vesical fistula.*
(675.) *Vesico-vaginal fistula.*
563. Hypertrophy.
564. Distension.
  a. Sacculated bladder.
  b. Rupture.
565. Inversion.
566. Extroversion.
567. Hernia.
(44.) *Cancer.*
568. Fibrous tumor.
569. Villous tumor.
570. Calculus.
  a. Uric acid.
  b. Urate of ammonia.
  c. Uric oxide. *Syn.* Xanthic oxide.
  d. Oxalate of lime.
  e. Cystic oxide.
  f. Phosphate of lime.
  g. Triple phosphate.
  h. Fusible.
  i. Carbonate of lime.
  k. Fibrinous.
  l. Urostealith.
  m. Blood calculus.
  Foreign bodies.
571. Hæmaturia (Vesical).
571*. Malformations.
(1083, 1091). *Injuries.*
572. Paralysis.
573. Irritability.
574. Spasm.
575. Neuralgia.
576. Incontinence of urine.
577. Retention of urine.

Diseases of the Prostate Gland.

578. Inflammation.
  a. Acute.
  b. Chronic.
579. Ulceration.
580. Abscess.
581. Atrophy.
(44.) *Cancer.*
582. Non-malignant tumors. *Syn.* Enlarged lobe of the prostate.
582*. Chronic enlargement.
583. Cyst.
(49.) *Tubercle.*
584. Calculi.

Gonorrhœa and its Complications.

585. Gonorrhœa.
  a. In the male.
  b. In the female.
586. Balanitis.
(841.) *Herpes preputialis.*
587. Phimosis.
588. Paraphimosis.
589. Bubo.
590. Lacunar abscess.
(580.) *Prostatic abcess.*
591. Epididymitis. *Syn.* Gonorrhœal orchitis.
  a. Abscess.
592. Abscess of the spermatic cord.
593. Condyloma.
  a. In the male.
  b. In the female.
594. Gleet.
(631.) *Inflammation of ovary.*
595. Abscess of the vulva.
(117.) *Gonorrhœal ophthalmia.*
(140.) *Gonorrhœal iritis.*
(35.) *Gonorrhœal rheumatism.*

Diseases of the Male Urethra.

595*. Urethritis.
596. Stricture.
  a. Organic.
  b. Traumatic.
  c. Spasmodic.
  d. Inflammatory.
597. Ulcer.
598. Urinary abscess.
599. Urinary fistula.
600. Recto-urethral fistula.
601. Extravasation of urine.
601*. Impacted calculus.
  a. Foreign bodies.
601†. Malformations.
(1078-1091.) *Injuries.*

DISEASES OF THE GENERATIVE SYSTEM.

Diseases of the Male Organs of Generation.

Diseases of the Penis.

602. Inflammation.
603. Abscess.
(505^{a}.) *Gonorrhœa.*
(593^{a}.) *Condyloma.*
604. Gangrene.
605. Priapism.
(43.) *Syphilis.*
(44.) *Cancer.*
  a. *Of the prepuce.*
  b. *Of the body.*
606. Non-malignant tumors.
(1078.) *Injuries.*
607. Malformations.
  a. Phimosis—congenital.

Diseases of the Scrotum.

608. Sloughing.
609. Œdema.
610. Elephantiasis.
(834.) *Prurigo.*
(43.) *Syphilis.*
(44.) *Cancer,*
(44^{c}) *Epithelial cancer.* Syn. *Chimney-sweeper's cancer.*
611. Non-malignant tumors,
611*. Malformations.

Diseases of the Cord.

612. Hydrocele.
  Varieties:
  a. Encysted.
  b. Diffused.
613. Varicocele.
614. Non-malignant tumors.
615. Neuralgia.

Diseases of the Tunica Vaginalis.

616. Inflammation.

617. Hydrocele.
Varieties:
a. Congenital.
b. Infantile.
c. Encysted.
618. Hæmatocele.
619. Loose bodies.

Diseases of the Testicle.

620. Orchitis.
a. Acute.
b. Chronic.
620*. Epididymitis.
621. Abscess.
622. Protrusion of tubuli. *Syn.* Hernia testis. Fungus testis.
623. Atrophy.
(43.) *Syphilitic diseases.*
(44.) *Cancer.*
624. Non-malignant tumors.
625. Cystic disease.
(49.) *Tubercle.*
(1078.) *Injuries.*
626. Malformations.
a. Fœtal remains in the testicle.
b. Malposition.
627. Spermatorrhœa.
628. Impotence.
629. Neuralgia.

DISEASES OF THE FEMALE ORGANS OF GENERATION IN THE UNIMPREGNATED STATE.

Diseases of the Ovary.

630. Inflammation.
631. Abscess.
632. Hæmorrhage.
633. Atrophy.
634. Hypertrophy.
(44.) *Cancer.*
635. Fibrous tumor.
636. Encysted dropsy.
637. Complex cystic tumor. *Syn.* Alveolar, gelatinous, and colloid tumor. Cystosarcoma.
a. With intracystic growths.
638. Cyst, containing tegumentary structures.
a. Cutaneous or piliferous cyst. *Syn.* Dermoid cyst.
b. Dentigerous cyst.
(49.) *Tubercle.*
639. Parasitic disease.
640. Dislocation.
a. Transplantation.
641. Hernia.
642. Malformations.

Diseases of the Fallopian Tube.

643. Abscess.
644. Dropsy.
645. Stricture.
646. Occlusion.
(44.) *Cancer.*
647. Cyst.
(49.) *Tubercle.*
648. Dislocation.
649. Hernia.

Diseases of the Broad Ligament.

650. Inflammation.
a. Pelvic peritonitis.
b. Pelvic cellulitis.
651. Abscess.
652. Cyst.
653. Periuterine or pelvic hæmatocele.

Diseases of the Uterus, including the Cervix.

654. Catarrh. *Syn.* Leucorrhœa.
a. Hydrorrhœa.
655. Inflammation.
656. Granular inflammation.
657. Abrasion.
658. Ulcer.
658*. Rodent ulcer.
659. Abscess.
660. Utero-vesical fistula.
661. Stricture of the orifice.
662. Stricture of the canal.
663. Occlusion of the orifice.
664. Occlusion of the canal.
665. Hypertrophy.
a. Elongation of the cervix.
666. Atrophy.
(44.) *Cancer.*
a. *Scirrhus.*
b. *Medullary cancer.*
c. *Epithelial cancer.*
667. Non-malignant tumor.
a. Fibrous tumor.
b. Polypus.
(49.) *Tubercle.*
668. Displacements and distortions.
a. Ante-version.
b. Retro-version.
c. Ante-flexion.
d. Retro-flexion.
e. Inversion.
f. Prolapsus.
1. Procidentia.
g Hernia.
669*. Malformations.

Diseases of the Vagina.

670. Catarrh. *Syn.* Leucorrhœa.
671. Inflammation.
672. Abscess.
(585b.) *Gonorrhœa.*
673. Cicatrix or band.
674. Vaginal fistula.
675. Vesico-vaginal fistula.
676. Recto-vaginal fistula.
677. Hernia.
a Cystocele.
b. Rectocele.
(44.) *Cancer.*
678. Non-malignant tumors.
a. Polypus.
679. Laceration.
679*. Malformations.

Diseases of the Vulva.

680. Inflammation of the labia.
681. Pruritus.
(843.) *Eczema of the labia.*
682. Œdema of the labia.
683. Abscess.
684. Gangrene.
685. Hypertrophy.
686. Occlusion.
687. Imperforate hymen.

(266.) *Varicose veins.*
(43.) *Syphilis.*
(44.) *Cancer.*
688. Vascular tumor of the meatus urinarius.
689. Mucous cyst.
(593*b*.) *Condyloma.*
689*. Malformations.

FUNCTIONAL DISEASES OF THE FEMALE ORGANS OF GENERATION.

690. Amenorrhœa. *Syn.* Absent menstruation.
    Varieties:
    a. From original defective formation.
    b. From want of development at the time of puberty.
    c. From mechanical obstruction.
    d. From temporary suppression.
691. Scanty menstruation. *Syn.* Deficient menstruation.
692. Vicarious menstruation.
693. Dysmenorrhœa. *Syn.* Painful menstruation.
694. Menorrhagia. *Syn.* Excessive menstruation.
694*. Hæmorrhage.
(56.) *Chlorosis.* Syn. *Green sickness.*

DISEASES OF THE FEMALE BREAST.

729. Inflammation.
    a. Acute.
    b. Chronic.
730. Abscess.
731. Sinus.
732. Galactorrhœa.
733. Deficiency of milk.
734. Hypertrophy.
735. Atrophy.
736. Depressed nipple.
737. Chapped nipple.
738. Ulcerated nipple.
(44.) *Cancer.*
    a. *Scirrhus.*
    b. *Medullary cancer.*

DISEASES OF THE CUTANEOUS SYSTEM.

(30.) *Erysipelas.*
827. Erythema. (This term includes
    1. Erythema læve.
    2. Erythema fugax. *Syn.* E. volaticum.
    3. Erythema marginatum.
    4. ,, papulatum.
    5. ,, tuberculatum.
    6. ,, nodosum.)
828. Intertrigo.
829. Roseola. (This term includes
    1. Roseola æstiva.
    2. ,, autumnalis.
    3. ,, symptomatica.
    4. ,, annulata.)
830. Urticaria. *Syn.* Nettle-rash.
    a. Urticaria acuta.
    b. ,, chronica.
    (Under one or other of these heads are included
    1. Urticaria febrilis.
    2. ,, evanida.
    3. ,, perstans.
    4. ,, conferta.
    5. ,, subcutanea.
    6. ,, tuberculata.)
831. Pellagra.
832. Acrodynia.
833. Asturian rose.
834. Prurigo.
835. Lichen. (This term includes
    1. Lichen simplex.
    2. ,, pilaris.
    3. ,, circumscriptus.
    4. ,, agrius.
    5. ,, tropicus. *Syn.* Prickly heat.)
    (The so-called Lichen lividus is really a form of Purpura.)
836. Strophulus. *Syn.* Red gum. Tooth rash. (This term includes
    1. Strophulus intertinctus.
    2. ,, confertus.
    3. ,, candidus.)
    (Strophulus albidus is referred to Acne.
    ,, volaticus to Erythema.)
837. Pityriasis. (This term includes Pityriasis capitis. *Syn.* Dandriff.)
    (Pityriasis versicolor is referred to Parasitic Affections as a *Synonym* of Tinea versicolor.)
838. Psoriasis. (This term includes Lepra.)
    a. Psoriasis vulgaris. *Syn.* Lepra vulgaris.
    b. Psoriasis guttata.
    c. ,, diffusa.
    d. ,, gyrata.
    e ,, inveterata.
840. Miliaria.
    a. Sudamina.
841. Herpes.
    a. Herpes phlyctenodes.
    b. ,, circinatus.
    c. ,, iris.
    d. ,, zoster. *Syn.* Shingles.
842. Pemphigus. *Syn.* Pompholyx.
    a. Pemphigus acutus.
    b. ,, chronicus
    c. ,, solitarius.
843. Eczema.
    a. Eczema simplex.
    b. ,, rubrum.
    c. ,, impetiginodes.
    d. ,, chronicum.
844. Impetigo.
    a. Impetigo sparsa.
    b. ,, confluens.
        1. Figurata.
        2. Larvalis. *Syn.* Porrigo larvalis.
845. Rupia.
    a. Rupia simplex.
    b. ,, prominens.
    c. ,, escharotica. *Syn.* Pemphigus gangrænosus.
846. Ecthyma.
847. Acne.
    a. Acne punctata.
    b. ,, indurata.
    c. ,, rosacea.
    d. ,, strophulosa. *Syn.* Strophulus albidus.
848. Sycosis. *Syn.* Mentagra.
849. Stearrhœa.
    a. Stearrhœa simplex.
    b. ,, nigricans.

850. Ichthyosis.
  a. Ichthyosis vera.
  b. „ cornea.
851. Xeroderma. *Syn.* Scleroderma Sclcriasis.
852. Leucoderma. (This term includes Vitiligo).
853. Albinismus.
854. Canities.
855. Melasma.
(286.) *Melasma Addisoni.* English name, *Addison's disease.* Syn. *Bronzed skin.*
856. Lentigo and Ephelis. *Syn.* Freckles.
857. Chilblain.
858. Frostbite.
859. Ulcer.
860. Fissures.
(353.) *Cancrum oris.*
861. Boil.
862. Carbuncle. *Syn.* Anthrax.
(26.) *Malignant pustule.*
863. Onychia.
864. Onychia maligna.
865. Whitlow.
  a. Thecal abscess.
866. Gangrene.
866a Senile gangrene.
866b. Bed sore.
867. Hypertrophy.
868. Corn.
(816.) *Bunion.*
869. Elephantiasis Arabum. *Syn.* Barbadoes leg, Elephas.
(48.) *True leprosy.* Syn. *Elephantiasis Græcorum.*
870. Atrophy.
  a. Linear atrophy.
  b. Alopecia.
  c. Atrophy of nails.
(44.) *Cancer.*
871. Fibro-cellular tumor.
872. Fatty tumor.
(267.) *Nævus vascularis.*
873. Nævus. *Syn.* Port-wine stain.
874. Nævus pilaris. *Syn.* Mole.
875. Sebaceous tumor.
  a. Steatoma.
876. Cornua.
877. Warts.
878. Condyloma.
879. Molluscum.
880. Cheloid.
881. Frambœsia. *Syn.* Yaws.
882. Delhi boil.
883 Aleppo evil.
(46.) *Lupus.*
(49.) *Scrofulous disease.*
884. Ingrown nail.
(912a.) *Silver stain.*
(992.) *Burns and scalds.*
884*. Cicatrices (state the cause).
(102.) *Hyperæsthesia.*
885. Pruritus.
(103.) *Anæsthesia.*
886. Ephidrosis.
887. Anidrosis.

PARASITIC DISEASES OF THE SKIN.

888. Tinea tonsurans. *Syn.* Ringworm. *Parasite,* Achorion Lebertii. *Syn.* Trichophyton tonsurans.
889. Tinea decalvans. *Syn.* Alopecia areata, Porrigo decalvans. *Par.* Microsporon Audouini.
890. Tinea favosa. *Syn.* Favus, Porrigo favosa. *Par.* Achorion Schœnleinii; Puccinia Favi.
891. Tinea versicolor. *Syn.* Pityriasis versicolor. *Par.* Microsporon furfur.
892. Tinea Polonica. *Syn.* Plica Polonica. *Par.* Trichophyton sporuloides.
893. Mycetoma. *Syn.* Madura foot. *Par.* Chionyphe Carteri.
894. Scabies. *Syn.* Itch. *Par.* Sarcoptes scabiei.
895. Phthiriasis.
896. Irritation caused by
  a. Pediculus capitis.
  b. „ palpebrarum.
  c. „ vestimenti.
  d. „ tabescentium.
  e. Phthirius inguinalis.
897. Irritation caused by Pulex penetrans. *English zyn.* Chigoe.
  „ Pulex irritans.
898. „ Cimex.
899. „ Leptothrix autumnalis. *English Syn.* Harvest-bug.
900. „ Wasps, bees, and other stinging insects.
(985a.)
901. „ Nettles and other stinging plants.

CONDITIONS NOT NECESSARILY ASSOCIATED WITH GENERAL OR LOCAL DISEASES.

902. Still-born.
903. Premature birth.
904. Old age.
905. Debility.

POISONS.

METALS AND THEIR SALTS.

906. Arsenic.
907. Mercury.
  a. Mercurial tremor.
(393.) *b. Mercurial inflammation of the dental periosteum.*
908. Lead.
  a. Lead colic. *Syn.* Painter's colic.
  b. Lead palsy.
  c. Blue gum.
(124b.) *d. Stain of the conjunctiva from lead.*
909. Copper.
910. Antimony.
911. Zinc.
912. Silver.
  a. Silver stain.
(124a.) *b. Stain of the conjunctiva from nitrate of silver.*
913. Iron.
914. Bismuth.
915. Chromium.
  a. Bichromate of potash.

CAUSTIC ALKALIES.

916. Potash.
917. Soda.
918. Ammonia.
919. Alkaline salts.

METALLOIDS.

920. Phosphorus.
(394.) a. *Phosphoric inflammation and necrosis of the alveoli.*

921. Iodine.

ACIDS.

922. Sulphuric acid.
923. Nitric acid.
924. Hydrochloric acid.
925. Phosphorous acid.
926. Oxalic acid.
927. Tartaric acid.

VEGETABLE POISONS.

928. Savine. (Juniperus sabina.—*Linnæus.*)
929. Croton oil. (Croton tiglium.—*Linnæus.*)
930. Elaterium. (Ecbalium officinarum.—*Rich.*)
931. Colchicum. (Colchicum autumnale.—*Linnæus.*)
932. Black hellebore. (Helleborus niger.—*Linnæus.*)
933. White hellebore. (Veratrum album.—*Linnæus.*)
    a. Veratria.
934. Squill. (Scilla maritima.—*Linnæus.*)
935. Ergot of rye. (Sphæria purpurea.—*Fries.*)
    a. Ergotism.
936. Opium. (Papaver somniferum.—*Linnæus.*)
937. Indian hemp. Cannabis Indica. (Cannabis sativa.—*Linnæus.*)
938. Alcohol.
    a. Delirium tremens.
939. Ether vapour.
940. Chloroform vapour.
941. Henbane. Hyoscyamus. (Hyoscyamus niger.—*Linnæus.*)
942. Deadly nightshade. Belladonna. (Atropa belladonna.—*Linnæus.*)
    a. Atropa.
943. Thorn apple. Stramonium. (Datura stramonium.—*Linnæus.*)
944. Prussic acid.
    a. Oil of bitter almonds.
    b. Laurel water.
945. Cyanide of potassium.
946. Nitro-benzole.
947. Wourali. Curara. Woorara. (Strychnos toxifera.—*Schomburgk.*)
948. Hemlock. Conium. (Conium maculatum.—*Linnæus.*)
949. Monkshood. Aconite. (Aconium napellus.—*Linnæus.*)
    a. Aconitia.
950. Foxglove. Digitalis. (Digitalis purpurea.—*Linnæus.*)
    a. Digitalin.
951. Tobacco. (Nicotiana tabacum.—*Linnæus.*)
    a. Nicotia.
952. Hemlock dropwort. (Œnanthe crocata.—*Linnæus.*)
953. Nux vomica. (Strychnos nux vomica.—*Linnæus.*)
    a. Strychnia.
    b. Brucia.
954. Upas tieute. (Strychnos tieute.—*Leschenhault.*)
955. Upas antiar. (Antiaris toxicaria.—*Leschenhault.*)
956. Calabar bean. (Physostigma venenosum.—*Balfour.*)
957. Fool's parsley. (Æthusa cynapium.—*Linnæus.*)
958. Water hemlock. (Cicuta virosa.—*Linnæus.*)
959. Camphor. (Cinnamomum camphora.—*F. Nees and Obermaier.*)
960. Cocculus Indicus. (Anamirta cocculus.—*Wight and Arnott.*)
961. Darnel. (Lolium temulentum.—*Linnæus.*)
962. Indian tobacco. Lobelia. (Lobelia inflata.—*Linnæus.*)
963. Laburnum. (Laburnum vulgare.—*Griesbach.*)
964. Yew. (Taxus baccata.—*Linnæus.*)
965. Poisonous fungi.
    a. Mouldy bread.
966. Poisonous grain.
    a. Lathyrus. (Lathyrus sativus.)
    Paralysis from Lathyrus.

ANIMAL POISONS.

967. Spanish fly. Cantharides.
968. Decayed and diseased meat.
969. Poisonous meat.
    a. Sausages.
970. Poisonous cheese.
971. Poisonous milk.
972. Poisonous fish.
    a. Mussels.

GASEOUS POISONS.

973. Ammonia.
974. Nitrous acid vapour.
975. Chlorine.
976. Carbonic acid.
977. Carbonic oxide.
978. Coal gas.
979. Cyanogen.
980. Sulphuretted hydrogen.
(939.) *Ether vapour.*
(940.) *Chloroform vapour.*
981. Putrid and morbid exhalations.
982. Other noxious effluvia.

MECHANICAL IRRITANTS.

983. Pounded glass.
984. Steel filings.

POISONED WOUNDS.

Varieties:
985. *a.* By venomous animals.
        1. Snakes.
        2. Scorpions.
985*. 3. Stinging insects.
(900.) *Cases of death from stinging insects should be entered here.*
    b. By animals having infectious disease
(23.) *Glanders.*
(24.) *Farcy.*
(25.) *Equinia mitis.*
(26.) *Malignant pustule.*
(91.) *Hydrophobia, Rabies.*
(2.) *Cowpox.*
986. *c.* By dead animal matter.
987. *d.* By morbid secretions.
988. *e.* By vegetable substances.
989. 1. Poisoned arrows.
(947.) *Wourali.*
990. Subcutaneous injection.
991. *f.* By mineral substances.

OUTLINES
OF
THE SCIENCE AND PRACTICE OF MEDICINE.

PART III.

THE NATURE OF DISEASES—SPECIAL PATHOLOGY AND THERAPEUTICS.

CHAPTER I.

ON THE NATURE OF THE SPECIFIC OR GENERAL DISEASES COMMONLY CALLED MIASMATIC.

In this and the following chapters on topics relative to the Pathology of General Diseases, it is intended to set forth the salient points regarding their *nature*, so far as they can be conveniently grouped together.

In a rude manner, the General Diseases may be classed as the first section of local diseases—the *blood* itself being regarded as diseased.

In them the blood is generally more or less changed; and to the greater number of diseases of this group the names of "*acute specific*," or "*miasmatic*," have been given.

The *specificity* of each of the diseases comprehended in the group consists in certain characters which distinguish each of them from any other disease, and in the constancy by which, from time immemorial, such characteristics have continued to distinguish them. Each of them has also some essential characteristics by which they are severally distinguishable. The course of the febrile phenomena is found to be distinctive; so also are the anatomical signs which distinguish the local lesions; and the order of the succession of phenomena is characteristic and constant for each of them. They have all—(1.) A more or less defined period of incubation, including an uncertain stage of *latency* and an obvious stage of *invasion;* (2.) A period of development towards the "*fastigium*" or acmé of the disease; (3.) A period of *defervescence*, or cooling down of the fever; (4.) Etiologically they are quite distinct from one another, and have a period of convalescence.

The *origin* of all of them, so far as "how their respective first *contagia* arose," is alike unknown—just as in Phyisology the exact "origin of species" is unknown. Indeed, these speculations may be only two phases of one question.

For exhaustive details, the reader must consult the larger Text-book.

The theory regarding these specific diseases has reference to the morbid poisons and their source. In SECTION A. of the GENERAL DISEASES, to be presently described, the chief or essential constituent of the specific morbific agent *enters the body from without;* while in SECTION B. the essential constituent of the morbific agents appears to be *inbred* in the body, and makes itself manifest by various constitutional indications previous to the development of local lesions, or the characteristic expression of the disease by other phenomena.

There is sufficient circumstantial evidence with regard to all of these diseases, and absolute proof with regard to some, that there is—

(1.) A morbid condition of the blood.

(2.) That the nature of that morbid condition is in many definite and specific, inasmuch as it may be produced at will by the introduction of a definite substance into the blood, which manifests itself by establishing a local disease, and which, within certain limits, has constant characters.

(3.) That the morbid matter or poison by which the condition of the blood is changed may accumulate or augment in quantity and virulence, and at length may be discharged in various ways from the body, and under a variety of organic forms, chiefly as excretory products of metamorphoses of tissue in the usual course of living change. But some are also discharged at the seats of specific local lesions which are set up, the morbid poisons being for the time accumulated in the morbid structures.

The diseases about to be considered differ very materially in their nature from the purely *local diseases.* While the latter may be regarded as mere *simple* diseases, the *general* diseases are possessed of such constant features, by which they may be distinguished from the simply local diseases, that they merit the distinction of SPECIFIC.

Certain types of morbid local lesions, however, are common to both; and therefore the *specific diseases* are to be recognised by some constant and characteristic modification over and above what is common, or by something in addition which distinguishes them.

These additional elements are mainly—

(1.) A certain constancy and regularity of development, metamorphosis, duration, and decline, during which certain common morbid processes become manifest and modified according to the *special* nature of the disease.

(2.) The whole blood in the specific diseases, for a time, seems diseased, and nearly every function and sensation is more or less disturbed from its state of health. The patient seems "ill all over" before the local disease appears.

(3.) In the specific diseases there is an apparent want of proportion between the cause and the effect.

CHAPTER II.

THE PHYSIOLOGICAL MODES IN WHICH POISONS OR DRUGS ACT, ILLUSTRATE BY ANALOGY THE ACTION OF THE SPECIFIC OR MORBID POISONS OF DISEASE.

THE actions of poisons and of drugs are subject to certain general laws, the most important of which are as follows:—

1. They have certain definite and specific actions, and though thus definite, their actions are variously limited. Some, for instance, act on the cells composing one structure, membrane, or organ, or on one system of organs; while other poisons or drugs extend their action over several parts, or even over the whole animal frame. Conversely also, the cells composing one structure take up and are acted upon by some drugs or poisons only, and not at all by others; while other structures are much affected by the very substances which had so little action on the first.

2. Poisons and drugs are apt to lie *latent in the system* for a certain but varying period of time before their specific actions are set up. On this law depends the time which drugs and poisons take to produce their effects. and the period of incubation of certain specific diseases.

3. The effects of poisons and drugs are modified by the amount of the dose, the temperament and habit of the body, and the existing state of the constitution, mental and bodily, of the recipient.

The specific action of poisons which produce specific diseases is proved by the fact, that the course, symptoms, and phenomena which result from the presence of any given morbid poison may be determined within certain limits.

The specific action of such poisons has also its periods of latency or of incubation. The poison of natural *small-pox* thus lies dormant for sixteen to twenty-one days before any constitutional disturbance is apparent—of scarlet fever, seven to ten days—of measles, ten to fourteen—of malaria, for as long as twelve months—and of hydrophobia still longer.

There are certain peculiarities in the action of poisons which induce specific diseases, unlike any characteristic of the action of poisons or drugs. It is not known that morbid poisons are *cumulative* in their action, like that of some drugs, except, perhaps, the action of *malaria*, which is also persistent in its pernicious influence almost throughout life. The actual quantity of any specific morbid poison required to establish disease is probably extremely small. It was tried at one time to produce a mild attack of small-pox by inoculation of a very small quantity of virus; but, although the disease was not always produced, yet, when it was produced, it assumed every form, character, and degree of severity that it has ever assumed.

Such dilution of the virus tends but to separate and diffuse more widely apart the organic active particles or germs which are the efficient carriers of the poison: hence, the greater the dilution the more the diffusion of these particles, and the more likely one would be to introduce a portion of the fluid used for inoculation destitute of those specific organic particles or germs, and so fail to produce the specific disease.

Another peculiarity of morbid poisons wholly unknown with drugs or other poisons, is the faculty which the human or animal body possesses, during the progress of the specific disease, of generating and multiplying, to an immense extent, a poison of the same nature as that by which the disease was originally inoculated or produced. Hence the belief in the independent living nature of these *contagia*.

A further peculiarity of morbid poisons is that, once they have produced their effects upon the body, the constitution is no longer susceptible to a second development of the same disease; but this rule has some exceptions.

The distinction so long attempted to be maintained between *infectious* and *contagious* diseases, and so also between *miasmata* and *contagia*, can be maintained no longer. The term *contagia* now comprehends all those *special agencies* by means of which the general diseases included in SECTION A. are known to spread. These are the chief human diseases and the most deadly. The nature of the contagious agencies by which the greater number of these diseases are communicated from one human being to another is at present the subject of active inquiry in this and other countries. In the case of certain diseases—namely, small-pox, vaccine discharge, glanders, and the contagious peripneumony of cattle, the active contagious agent seems to be in the form of extremely minute solid particles (not mere vapours or exhalations), shewing to the highest powers of the microscope as "glistening points" of extreme minuteness ($\frac{1}{50,000}$ of an inch). These particles are of the same specific gravity as the liquid with which they are surrounded, and have the same colour and transparency; and, after being washed in water, retain their power of propagating their specific diseases. The water in which they have been washed does not possess this power. These facts have been determined by actual experiments as regards the vaccine poison. Special implication of some part of the body usually attends each of the specific diseases, and these specially implicated parts are usually most prolific of *contagia*, with rapid growth of products and frequent surface detachment. The epidermic scales and epithelium shed in cases of scarlet fever from skin, mouth, and throat, and the pellicle of the *diphtheritic* membrane, undoubtedly contain the respective poisons of these diseases, which also retain their power after exposure to the air for weeks, so that they become perfectly dry. Thus the poison exists also in the dried scabs from the small-pox and vaccine pustules. The exact physical condition (as to being fluid or solid) in which the contagia exist, is not determined for all diseases; but the independent solid particles, which are the active *contagia*, are probably contained in the fluid pus of ulcerated surfaces from the respective diseases of *gonorrhœa*, *syphilis*, *puerperal peritonitis.* Thus these active particles being so minute, are believed by some to have no palpable existence; but they are not less certainly given off from the various surfaces of the diseased body, and especially from the cutaneous and mucous surfaces—in the exanthemata mainly from the skin and throat by discharges from the mouth, nose, and eyes; in *measles*, from the skin and bronchial secretions; in *typhus* and *plague*, it is passing constantly from the skin; in *enteric* fever and *cholera*, the bowel discharges are the active media known to propagate the disease, and hence known to contain the *material agents* or *contagia.* These discharges are still further believed to impart their specific poison-properties to other fæcal excreta with which they may be mixed; in *hydrophobia*, the poison is contained in the secretions from the mouth; in *yellow fever*, in discharges from the stomach; in *dysentery*, in emanations from the stools;

in *hooping-cough*, in the breath or emanations from the lungs. The blood also may contain the material elements of the specific poison or contagia. This is so in cases of active syphilis and in that of *glanders*, as determined by experiment. The bodies of persons dead from contagious diseases may continue after death to be the means of propagating the disease. This is so with small-pox especially.

Thus it is that from one or other of these sources in each of the specific diseases, the active agents of the poison or contagia are thrown off as actual portions of the living body, and so they pass into the air, or find their way into water or food, introducing themselves into our body as we breathe, drink, or eat; or, through some broken surface the poison *inoculates* the system. The independent living nature of *contagia* is also believed, mainly, on account of the extraordinary powers of increase of the specific poison from an infinitesimally minute amount of the original poison, as may be seen in *small-pox*, *vaccine*, *hydrophobia*, *puerperal fever*, *scarlatina*, *syphilis*, *gonorrhœa*; also, on account of their capacity of producing their like, and their like only; of the retention of these powers for some time, and the ultimate final loss by decay or destruction of the specific-poison substance; of the peculiar periods of incubation, fixed as to certain diseases, during which the active-poison agent is gradually developing itself and multiplying and reproducing itself in the body a thousandfold.

As to the actual nature of the *contagium* or *virus*, whose material existence is thus beyond dispute, there are three views entertained at present, all of which are comprehended in what is commonly described as the "*germ theory*," which holds that each specific disease has a specific poison-germ which lives, grows, and has a being specifically distinct from each and all other germs. The following are the three views held as to the nature of these *germs* as defined by Dr. Parkes. (See his *Practical Hygiène*, 4th edition, p. 474.)

(1.) That they are particles of animal origin, born in and only growing in the body, as *bioplasm* or *protoplasm*.

(2.) That the particles are of *fungoid* origin, simply growing in the body after introduction from without.

(3.) That the particles are of the nature of *schizo mycetes*—a class of organisms separate from fungi, and of the simplest or lowest form of animate existence, represented by *bacteria*, *zooglea*, *microzymes*, *micrococci*, *microphytes*, *vibrios*, *monads*.

The first of these views is the most consistent with the clinical phenomena and natural history of the specific diseases; the 2nd and 3rd views are nearly similar, and are of similar significance, if the implied nature of the particles they seek to establish causes them to be regarded as the carriers of *contagia* merely.

The idea of the specific poisons being of the nature of a *zyme* or *ferment* is no longer entertained. In some of the general diseases not known to be *contagious*, as in the malarious fevers, the specific poison is believed to be in the form of a volatile gas, a chemical agency, or some organic emanation giving support to low forms of life, and believed to be the cause of malarious infection. Seeing that these general diseases are thus propagated by *contagia*, it becomes of practical importance to determine the periods in each of them during which they are more or less infectious. Generally, it may be stated that the power of giving off *contagia* begins as soon as the disease begins, and lasts for a variable time after it is over. Some diseases, such as measles and hooping-cough, are propagated as certainly while in the preliminary stage of incubation as when fully developed. This period of incubation is made up of two stages—a stage of latency and a stage of invasion—which generally marks the time when the infection begins, when the patient is said to be "sickening" for the approaching disease—a "sickening" which is characterised by fever and a predominance of general over local symptoms; and during this stage the actual nature of the special disease may remain doubtful.

The rapidity with which the poison of disease acts varies with the form of the poison, and with the mode in which it finds ingress.

Small-pox introduced by inoculation takes nine days to incubate; by inhalation, fourteen. Measles introduced by inoculation takes seven days to incubate; by inhalation, ten or twelve days.

In some diseases the "incubation" is rendered long by the uncertain length of the period of latency. Such is the case with *small-pox*, *vaccinia*, *measles*, *rubeola*, *mumps*, *varicella*, and *typhoid fever*. Diseases having a short incubation period are especially *scarlet fever*, *diphtheria*, *plague*, *cholera*, *diarrhœa*, *influenza*, *erysipelas*. Diseases intermediate between the two sets as to length of incubation are *typhus fever*, *relapsing fever*, and *hooping-cough*. Contagia are most abundant and the diseases are most contagious towards their termination, when the incubation period has been short. In the former class, where the period of incubation has been long, the early stage is generally a source of danger; and the danger of infection from them becomes greater and greater as the height of the disease is reached, and only ceases after diseased action is over and the evidence of past disease has cleared away, as when the crusts of small-pox have fallen off and desquamation of the cuticle in scarlet fever has taken place.

In typhoid fever, contagia cease to be given off soon after, if not as soon as, convalescence is established; while typhus is most virulently contagious after more than a week of complete convalescence. Hooping-cough is communicated with great frequency in its earliest stages—even before the characteristic "hoop" has expressed itself. Although incapable at present of absolute proof, there are good reasons for believing that the contagia of some of these specific poisons float about in the atmosphere, such as those which arise from typhoid or cholera evacuations, producing their effects, not on the lung or blood, but on the alimentary mucous tract with which they come in contact on being swallowed.

When the poison is implanted or introduced through a thin or abraded cutaneous surface, or is directly introduced by a tooth or a weapon which inflicts a wound or abrasion, and at the same time introduces the poison, a "poisoned wound" is the result, which produces "general symptoms" or propagates inflammation to other parts of the body. The patient thus becomes inoculated with the specific poison. The changes which the absorbed virus of specific diseases thus undergoes in the living and infected body are—(1.) increase, (2.) transformation, (3.) combination, (4.) separation or excretion. In these respects the *specific poisons* of diseases differ from the *venoms* of animals such as poisonous snakes. (See *Science and Practice of Medicine* by the Author, p. 389, vol. i., for detailed exposition of these four changes.)

The general diseases under Section A., to be presently described, may be grouped together, according to more or less natural alliances, as follows:—

I. EXANTHEMATA (five in number); characterised by a specific peculiar cutaneous eruption—namely, *small-pox*, *cow-pox*, *chicken-pox*, *measles*, *scarlet fever*.

II. CONTINUED FEVERS (seven in number); so defined by the College of Physicians—namely, *dengue*, *typhus fever*, *enteric fever*, *relapsing fever*, *simple continued* (*specific*) *fever*, *puerperal fever*.

III. PAROXYSMAL or MALARIOUS FEVERS (five in number)—namely, *yellow fever* (*malarious*), *ague*, *remittent fever*, *puerperal*, *ephemera* or *weed*.

IV. EPIDEMIC and MALIGNANT, but PAROXYSMAL, rather than CONTINUED—namely, *cerebro-spinal fever* and *specific yellow fever*.

V. SPECIFIC, EPIDEMIC, and CONTAGIOUS, but not otherwise characterised—namely, *plague*, *cholera*, *diphtheria*, *hooping-cough*, *mumps*, *influenza*.

VI. DISEASE-POISONS, connected with unhealthy states of wounds or sores, with epidemic exanthemata, or with diseases of animals—namely, *glanders*, *farcy*, *equinia mitis*, *malignant pustule*, *phagadena*, *sloughing phagadena*, *hospital gangrene*, *erysipelas*, *pyæmia*.

We have no antidote for any of these specific diseases. We cannot cure any of them. We can but guide the patient through them with the best of our knowledge and experience in maintaining life till the natural course of the disease has been passed through.

A distinction ought to be made between the disease-poisons which are reproduced during the processes of disease, such as of the *exanthemata* and *continued fevers*, as contrasted with those disease-poisons which are not less specific, but which do not appear to be reproduced in the system, as in the case of *malarious* and *paroxysmal fevers*, which are not believed to be propagated by contagion.

CHAPTER III.

NATURE OF MALARIA AND OF MALARIOUS FEVERS.

Three varieties, forms, or types of malarious fevers exist having many essential features in common. These are *intermittent fever* or *ague*, *remittent fever*, and a variety of *yellow fever*, characterised by a periodicity of febrile occurrence. In all these forms of fever a poison, called *malaria*, of an unknown nature, generated in paludal regions or littoral districts, is absorbed, and affects the system through the blood, as cholera, typhus, and other specific poisons do. Physicians infer the existence of *malaria* as a specific poison. Its substantial existence has yet to be proven; but it seems to arise from marshy land in a state of decomposition, under the influence of partial moisture and of heat above 60° Fahr. If this land is perfectly dry or drained, or perfectly flooded or frozen, *malaria-poison* is not generated or given off.

It is believed to be a material poison, from the following facts:—It may be carried along with the wind, so as to induce the characteristic and specific fever at a distance from the place where the poison is generated. It may be intercepted also by a belt of trees; and it appears to be most intense near the surface of the ground. The poison produces certain specific effects upon the body, especially characterised by *periodicity* in the development of febrile exacerbations; and it also impresses a character of periodicity on ailments contracted by the patient after suffering from malaria, and a disposition to the recurrence of neuralgic affections, which may last for life.

By numerous observations it has been established that some aëriform material, but more probably of an organic vegetable nature and poisonous, is exhaled from marshy or wet grounds in the progress of drying. Agues have always been observed to be the diseases of moist or marshy districts; and to prevail most in low, swampy, and humid countries, where seasons of considerable heat occur. The vicinity of marshes, or of a district that has at some recent time been under water; the banks of great lakes, and the shores of great rivers and seas, where the water flows slowly, and in some places stagnates, in shallow rivers over land alluvial, low, and flat; extensive flat tracts of wood, where much moisture is constantly present, where the process of drying is uninterrupted, and yet the surface constantly exhaling humidity;—these are some of the terrestrial physical conditions in which the paludal and the littoral fevers are found to abound. It must also be admitted, however, that these diseases do not prevail in *all* marshy districts, and they cannot, in some cases, be traced to a residence in the vicinity of marshes.

The concurrence of circumstances under which paludal and littoral fevers have been observed to become developed may be shortly stated as follows:—(1.) A certain degree of heat. A high temperature is especially favourable to the production of malaria, and the more so when acting on moist alluvial soil. (2.) A certain relation as to season, variable with the geography of the locality in which such fevers prevail. The season of the year most marked in tropical climates is that which immediately succeeds the cessation of the rains, or, as it is called, "the drying up of the rains." (3.) Low swampy grounds and extensive rice-fields are well-known sources of malaria. In such districts clouds of mist are often seen wafted along the earth's surface for miles; and it is believed that *malaria*, whatever be its nature, clings to such mists. But although it has been observed that absolute marshes do not always produce agues, nor that agues are always due to obvious marshes, yet it is generally found that in districts where such paludal fevers abound the surface is porous, penetrable, and retentive of moisture, although it does not appear on the surface of the ground; that the district had been at one time submerged; and that it continued slowly but constantly to undergo the process of desiccation; or while at certain seasons it imbibes moisture from local or meteorological sources, at other seasons it undergoes the drying process under intense solar heat. Such are some of the most sickly and febriferous districts in Europe, India, and America. For example, the Maremma of Italy; the district of the lakes near Varna, in Bulgaria; many districts in Burmah; many newly cleared tracts in North America; and many parts in the south of Spain. In most of these places the conditions of the surface of the ground are very much alike. While no obvious appearance of a marsh exists, the vigour of vegetation is extreme, amphibious animals abound, of the batrachian kind, plants and cephalopodous mollusca of notoriously marshy regions find a habitat, and the rich alluvial soil is so imperfectly cultivated that the process of vegetation is not adequately exhausted, and a surface of humid ground is exposed to the solar heat, and so exhales a material which exercises a persistent deleterious influence on the human frame. It is believed that the number of insects and some reptiles with which a place abounds is more significant of its insalubrity than almost any other circumstance; and that a mixture of animal and vegetable matters undergoing decay gives rise to miasms much more noxious than those resulting from vegetable matter alone.

The usual localities in which paludal fevers abound are those in which the soil consists of mineral, vegetable, and animal matters, mixed together in such proportions and of such constituents chemically as tend to absorb moisture and retain it, and subsequently to decompose. Such soils are known as *alluvial.*

High grounds near exposed marshes are often more unhealthy than the places immediately adjoining which are on a level with them.

It is observed that the surface of the earth may be dried either by the direct rays of the sun, or by currents of hot dry air wafted over it, or by both combined; but it is principally by the direct rays of the sun that the deleterious material of the soil is liberated; and it seems to be at a certain period of this "drying up" process that the exhalations are more potent than at another time in developing paludal fevers. The exposed ground, after clearing off the copious vegetation from dense jungles, so as to admit the influence of the sun's rays in "drying up," is known to be a fertile source of malaria.

There appears also to be a certain state of the human frame which renders it more than usually susceptible to this disease. The natives of warm and tropical climates are much less frequently and less violently attacked with paludal or littoral fevers than settlers or visitors from other lands. In the Mediterranean, along the coast of Africa, in the East Indies, in the West India Islands, and in the Southern States of the Union, new-comers from the northern latitudes are almost invariably attacked, and suffer much more severely from the fever than those who have been long in the country. It has been also noticed that those who, after residing in a territory where paludal fevers abound, have been out of it for some time, an augmented susceptibility to renewed attacks of the fever becomes manifest on their return.

Other causes predispose to those fevers, and none more than laborious or fatiguing duty in military or naval operations, labouring in the sun, exposure to chill, or from great heat suddenly to cold, excess in eating or drinking, intellectual exertion combined with bodily fatigue, and a crowded state of the population. Indeed, *sun-stroke*, or heat apoplexy, is regarded by some as a form of remittent fever.

CHAPTER IV.

ON THE NATURE OF ENDEMIC, EPIDEMIC, AND SPORADIC INFLUENCES.

Endemic influences are those conditions or agencies peculiar to a locality which favour the development of certain general diseases of the Class A, commonly called *miasmatic*, and which are thus accountable for their sudden origin in a place. Such diseases are then said to be endemic. Malarious diseases are especially so.

Epidemic influences are conditions under which some of these general diseases spread very rapidly, so as to incapacitate and destroy great numbers of the people. The diseases are then said to be *epidemic*. Solitary cases of such diseases sometimes occur indifferently in every season and situation in an isolated and scattered manner, from accidental or unrecognised causes, and quite independently of any epidemic or contagious influence. Such diseases are called "*sporadic*."

Endemic influences become mainly active through the following conditions, namely:—

1*st*. That the specific poisons by which the communicable diseases, such as *small-pox* or *typhoid* fever, propagate their kind are never totally in abeyance.

2*nd*. The specific communicable diseases are constantly extant somewhere, and only under conditions favourable to their dissemination do they spread or become epidemic. Although their germs, specific gases, active principles, or media of propagation and development, may lie dormant or latent for a time, it is not to be inferred that they have ceased to exist.

3*rd*. The history of all the specific communicable diseases demonstrates the same alternations of slumber and activity; of wide-spread prevalence in one place, while neighbouring places may remain free;

and, finally, the same successive invasion of neighbouring places, such that the prevailing disease only begins to prevail in the new locality after it has already died out in the old.

4th. One element remains constant in the history of endemic influence, and that is the *specific morbid poison* which is the origin of each case. It is susceptible of transmission from place to place, gathering strength as it proceeds, again to die out or become dormant, so that its track is with difficulty followed or traced out.

5th. In large cities such specific poisons are always more or less active, and their diseases always present; but in the country districts they only now and then occur. The occurrence of long intervals of rural exemption is not traceable to any feebleness of the poison to act; for when the disease does become developed in these places, the ratio of persons or of animals attacked is incomparably greater than is ever seen in cities under like circumstances.

6th. In large towns the sewers are constantly charged with the *materies morbi* of specific diseases always abounding in towns. In small villages, and other places where no sewers exist, the air only may be infected, or the water contaminated, by the direct or indirect importation of cases of specific disease or their equivalents—the poison itself—so that the organic impurities, the dung-heaps, the open soil which surrounds the dwellings of the patients, the cesspools, and the privies common to several houses, gradually but eventually become impregnated with the specific poison of the disease. Thus the atmosphere of the village may become incomparably more virulent than the atmosphere of the sick-chamber itself. Hence the rapid epidemic spread of the miasmatic diseases in the limited space of rural villages; and which gives rise to the popular error, that such diseases are invariably contagious in country places, and only rarely so, or by exception, in cities or large towns.

7th. All these specific diseases multiply their kind after similar modes of propagation.

8th. Each of them establishes a constant series of morbid changes and lesions, and always issues in the reproduction of its own *specific germ*, *morbid poison*, or *active principle* by which it propagates its kind. Thus *small-pox* propagates *small-pox; measles* multiplies *measles; scarlatina* reproduces *scarlatina; typhoid fever* breeds *typhoid fever; typhus*, *typhus;* and so on. In "races the most diverse, under climates the most various, age after age, through endless generations of man, these diseases pass down through the human body (sometimes through animals —*e.g.*, *ovine small-pox?*), perpetuating their own kind, and each maintaining its separate identity by marks as specific as those which distinguish the ash from the alder or the hemlock from the poppy." Such being the case, it is difficult to conceive "*that diseases of whose propagation this is the history can ever be generated in any other way.*" Most of these miasmatic diseases also are peculiar to man; while animals on their part are infested by a whole brood of communicable diseases, no less specific in their kind, each distinct from the other, and most of them, although some may be communicable to man, are incapable of multiplying in the human body. Cattle appear to be subject to a variety of malignant and communicable fevers from which man is altogether exempt.

9*th.* Certain receptive conditions, or a predisposition (the nature of which is unknown), exist in individuals, which appear essential to the development of the specific poisons and the establishment of the disease; and immunity against a repetition of the disease is generally conferred by one attack of the same disease—an immunity which has been proved by experiment on an enormous scale with regard to small-pox; and with regard to the other diseases of this kind, the belief in such immunity is deduced from extensive observation. But the immunity acquired by one attack of any of these diseases is of no avail against the rest. Measles, for example, renders the body proof against measles, but leaves it as open to small-pox as before, and so on of the rest.

10*th.* With regard to fermentation, putrescency, or decomposition, there is some reason to believe that it may quicken the activity or facilitate the development of specific morbid poison, in the way of a predisposing cause. There is no small amount of circumstantial evidence tending to shew that endemic conditions may be thus far favourable to the propagation of specific diseases, even to the extent of epidemics, in consequence of the predisposing agency of putrescent emanations; and, on the other hand, both endemic and epidemic influences are often held in abeyance by the tendency to decay, decomposition, and destruction of the specific germs, or disease-poisons themselves. They are stamped with the tendency to change and to perish. Like all organic substances which propagate from minute or invisible beginnings, myriads perish for one that is fruitful. This is especially demonstrable in respect of the Parasitic diseases, whose germs would overrun the world if they all came to maturity; but the extinction or the dispersion of the specific poisons is abundantly provided for through the operation of many natural causes; and by imitating some of these operations of Nature we may be able eventually to exterminate, or, at all events, greatly to modify the severity and reduce the mortality from many of these diseases.

The belief in the spontaneous endemic origin of the specific miasmatic diseases rests on evidence entirely *negative*—namely, the fact that cases do spring up in which it is impossible to trace the disease back to a personal source of specific propagation and dissemination—an event which is inherent in the very nature of these diseases. For the active principle of the poison is invisible, although the matter that is known to contain it may be capable of isolation and inoculation, as in small-pox; yet the existence of the specific disease-poison is known to us by inference only. Again, we know that ample provision is made, and ways are open, for the dissemination of the active agent of propagation in a thousand unseen modes, so that it is obvious that the precise source of infection and its track must often baffle the wisdom of man to discover or trace it out.

Cases thus constantly arise which appear to give countenance to the belief that the disease has had a spontaneous origin—*sporadic*, as it is termed. Numerous cases of small-pox occur which can never be traced to their source, or to communication with persons similarly diseased; yet the history of small-pox is decisive against the notion of its spontaneous origin; and if of small-pox, so for all the other specific diseases of the same nature.

The precise mode in which the miasmatic diseases, with their specific poisons, first came into existence is beyond our *ken*—hidden from us as yet by a vail, and remaining an inscrutable, at least as yet an unpenetrated, mystery. But everything tends to shew that once created, they all propagate only in one way—namely, by continuous succession.

Epidemic Influence.—The second characteristic feature peculiar to some of the miasmatic diseases is, that they sometimes spread rapidly, so as to incapacitate and destroy great numbers of the people. The disease is then said to be *epidemic* (επι, upon, and δημος, the people).

"All we can say, with certainty, regarding epidemics is, that there must be some distempered condition of the circumstances around us—some secret power that is operating injuriously upon our system—and to this we give the name of *epidemic influence* or *constitution*," and which is believed to predispose towards the receptivity of specific disease-poisons.

A careful study of the effects of the *epidemic influence* appears to warrant the enunciation of certain laws which seem to regulate its operations. These laws may thus be condensed:—

Laws of Epidemic Influence and Conditions under which they act.

(1.) This influence frequently predisposes to diseases, apparently independently of any other known cause, as in the case of influenza and cholera. It makes itself manifest by appearing to give increased energy to causes which produce particular diseases; so that small-pox, scarlatina, typhus, and the like, sometimes rage with great violence as epidemics. It also appears to predispose to new and anomalous forms of disease, as witnessed in the furunculoid epidemic which recently prevailed both in Europe and America, from 1849 to 1852.

(2.) Sometimes the *epidemic influence* manifests itself by a certain type or direction which existing diseases appear to take. Thus, at one period diseases take a low, or what is called a *typhoid* type, so that depletion is not tolerated; at another time an *inflammatory* tendency predominates, and antiphlogistic treatment is required. At one period there is a tendency in disease to complicate its course by a disposition to affect particular organs. At one time head affections predominate; at another time affections of the chest, or of the alimentary canal, complicate the course of a prevailing disease. Consequently the same disease may demand very different, and even opposite, modes of *management.*

(3.) During epidemics other diseases are apt to assume more or less of the prevailing epidemic features. Thus, when cholera prevails, looseness of the bowels often complicates the course of other affections. When influenza prevails, catarrhal complications increase the danger of other diseases. Ill-health of any kind, therefore, favours the action of the epidemic influence.

(4.) Some change in the character of prevailing diseases of a constant and recurring kind often indicates the approach of an epidemic and the prevalence of the epidemic influence.

(5.) The first effects of the *epidemic influence* are usually the most violent and marked, and the cases of the epidemic disease become mild as the *epidemic influence* passes away.

(6.) The *epidemic influence* sometimes disappears entirely after a short prevalence; sometimes continues, with irregular intermissions, for two, three, four, or even six years, or longer. Influenza and cholera are examples.

(7.) An epidemic tendency, after continuing for several years, may give place to one of a different kind, which, in its turn, may again give place to the first. *Malarious fevers*, *yellow fever*, and *typhus* illustrate this in America. The eruptive affections seem to run in somewhat similar cycles. After the introduction of vaccination *small-pox* seemed for many years to be almost entirely subdued; but more recently again the disease has seldom been entirely absent from among us, alternating as an epidemic now and then with *measles*, *scarlet fever*, and *typhus*. We look forward to the time when vaccination, enforced by law, will completely eradicate this disease.

(8.) The lower animals are also subject to epidemic influences; and seasons of unusual fatality among them have coincided with those in which the human race have suffered. This fact has been well shewn in an elaborate and erudite analysis of the census of Ireland, by Sir William R. Wilde, of Dublin, the diseases of the population having been recorded at the time.

CHAPTER V.

MANAGEMENT OF EPIDEMICS; AND ON PROCEEDINGS WHICH ARE ADVISABLE TO BE TAKEN IN PLACES ATTACKED OR THREATENED BY EPIDEMIC DISEASES.

The practical questions immediately involved in the exposition which has been given of the nature of the specific or miasmatic diseases in particular, are contained in the following statement, namely:—That it is possible to extinguish or "stamp out" the greater number of epidemic diseases, however intense or abundant may be the atmospheric or other agencies which constitute their potential causes, by acting according to the dictates of the following elementary facts:—

(1.) That the living body of the diseased persons is the soil on which the communicable disease breeds the poison by which the specific disease is multiplied and propagated.

(2.) That excretions from an infected person, especially such excretions as are immediately related to or flow from parts affected with specific lesions, probably contain the most active elements of the specific poison by which the disease may be disseminated.

(3.) That such active elements, *germs*, *poisons*, *active principles*, or *noxious agents*, may contaminate the drinking-waters of a district, or may infect the atmosphere, or lie dormant for variable and unknown periods of time, just as seeds or ova dry up and preserve their vital properties.

The principles of medical practice which those elementary facts dictate are embraced in the following statements:—

(*a.*) To follow out zealously the hygienic measures which flow from these facts, and so prevent the propagation of specific diseases.

(*b.*) To preserve as much as possible the blood of every individual in that state which shall prevent these poisons from finding the conditions of their development within the body.

(*c.*) That these ends are to be attained, on the one hand, by preventing the production of fermentable matter in or out of the body; and, on the other hand, by promoting its removal and chemical destruction or decomposition when it is inevitably generated, by a free supply of pure air, and by the reduction of that air to the lowest temperature at which the condition of the individuals will allow it to be safely inhaled. Preventive measures based upon these principles are of the utmost importance.

Detail of Proceedings advisable to be taken in Places attacked or threatened by Epidemic Diseases.

1. Wherever there is prevalence or threatening of any epidemic disease, it is of more than common importance that the powers conferred by the Nuisances Removal Acts, and by various other laws for the protection of the Public Health, be vigorously, but at the same time judiciously exercised by those in whom they are vested; and with regard to armies, that the instructions relative to the guidance of the Medical Officer in sanitary matters, contained in the *Army Regulations*, be duly carried out, on the principle that *the executive should act under authority*, in order to carry out the required measures efficiently.

2. If the danger be considerable, it will be expedient that the local authorities in civil life, and the commanding officers of armies, brigades, divisions, and regiments, in military life, avail themselves, as soon as possible, of the medical advice within their reach, in taking measures of prevention and protection against the spread of disease.

3. Measures of precaution for prevention and protection are equally proper for all classes of society, civil and military. But it is chiefly with regard to the poorer civil population—therefore chiefly in the courts and alleys of towns, and at the labourers' cottages of country districts and dairy farms—that local authorities are called upon to exercise the utmost vigilance, and to proffer information and advice. Common lodging-houses, and houses which are sublet in several small holdings, always require particular attention.

4. Wherever there is accumulation, stink, or soakage of house refuse or other decaying animal or vegetable matter, the nuisance should as

promptly as possible be abated, and precaution should be taken not to let it recur. Especially all complaints which refer to *sewers* and *drains*, or to *foul ditches* and *ponding of drainage*, or to *neglect of scavenging*, should receive immediate attention. The *trapping* of *house drains* and *sinks*, and the state of *cesspools* and *middens*, should be carefully seen to. In *slaughter-houses*, and other places where beasts are kept, strict cleanliness should be enforced.

5. In order to guard against the harm which sometimes arises from disturbing heaps of offensive matter, it is often necessary to combine the use of chemical disinfectants with such means as are taken for the removal of filth; and in cases where removal is for the time impossible or inexpedient, the filth should always be disinfected. Disinfection is likewise desirable for unpaved earth close to dwellings, if it be sodden with slops and filth. Generally, where cholera or typhoid fever is in a house or barrack, hospital or hut, the privies especially require to be disinfected.

6. Sources of water supply should be carefully and efficiently examined. Those of them which are in any way tainted by animal or vegetable refuse—above all, those into which there is any leakage or filtration from sewers, drains, *cesspools*, or *foul ditches*—ought no longer to be drunk from. Where the disease is cholera, diarrhœa, or typhoid fever, it is especially essential that no foul water be drunk.

7. The washing and lime-whiting of uncleanly premises (houses, huts, hospitals, barrack guard-rooms, and the like), especially of such as are densely or multifariously occupied, should be pressed with all practicable despatch.

8. Overcrowding should be prevented. The sick-room should, as far as possible, be free from persons who are not of use or comfort to the patient.

9. Ample ventilation should be enforced. Window-frames should be seen to,—(1.) That they may be made to open, if not so made; and, (2.) that they be kept sufficiently open. Especially where any kind of specific disease, communicable by infection of the air, has begun, it is essential, both for patients and for persons who are about them, that the sick-room and the sick-house or hospital be constantly and efficiently traversed by streams of fresh air. This is especially necessary at night, and steps should be taken to ensure efficient ventilation, even at some real or imaginary expense of comfort.

10. The cleanest domestic habits should be enjoined. Refuse matters should never be suffered to remain or to linger within the dwelling, hospital, barrack-room, or hut. Such refuse must *at once* be

removed, and at once disposed of, or cast into the receptacle provided for it. All things or utensils which have to be disinfected or cleansed should always be so *without delay.*

11. With regard to material substances discharged or separated from the bodies of the sick, special precautions of cleanliness and disinfection are necessary. Among discharges or substances separated from the body which it is proper to treat as capable of communicating disease, are those which come, in cases of small-pox, from the affected skin; in cases of cholera and typhoid fever, from the intestinal canal; in cases of diphtheria and scarlatina maligna, from the nose and throat, and the exhalations from the skin and the lungs saturating clothes; likewise, in cases of eruptive fevers, measles, scarlatina, rötheln, typhus, and the like, the general exhalations of the sick, and especially so of the convalescing, probably in connection with the desquamation of the skin. The caution which is necessary with regard to such matters, must of course extend to whatever may be imbued with them; so that bedding, clothing, towels, and other articles which have been in use by the sick, do not become sources of mischief, either in the house to which they belong, or in houses to which they are conveyed. Moreover, in typhoid fever and cholera, the evacuations should be regarded as capable of communicating a similarly specific and infectious property to any night-soil with which they may be mingled in privies, drains, or cesspools. This danger of multiplying the sources of communicating disease must be guarded against by the chemical destruction, decomposition, or disinfection of all the intestinal evacuations as soon as they are passed from the bowels, and certainly before they are thrown away, and so "let loose upon the world." Above all, they must never be cast where they can run or soak into sources of drinking-water.

12. All reasonable care should be taken not to disseminate disease by the unnecessary association of persons suffering from the specific communicable diseases, either with healthy persons, or in wards of hospitals where patients suffering with other diseases are being treated. This care is requisite, not only with regard to the sick-house, ward, hospital, or ship, but likewise with regard to day-schools, places of public resort, courts of justice, and other places where members of many different households are accustomed to meet.

13. Where dangerous conditions of residence cannot be promptly remedied, it will be best that the inmates, while unattacked by disease, remove to some safer lodging. If disease begins in houses where the sick person cannot be rightly circumstanced and tended, medical advice ought to decide on the propriety or fitness of removing him to an

infirmary or hospital. In extreme cases, special infirmaries may become necessary for the sick, or special houses of refuge for the endangered.

14. The questions of quarantine ought to be decided by the circumstances of the special case, the preceding principles being kept in view.

15. Privation, as predisposing to disease, may require special measures of relief.

16. In certain cases special medical arrangements are necessary. For instance, as cholera in this country almost always begins somewhat gradually, in the comparatively tractable form of what is called "premonitory diarrhœa," it is esssential that, where cholera is epidemic, arrangements should be made for affording medical relief without delay to persons attacked even slightly with looseness of the bowels. So again, where small-pox is the prevailing disease, it is essential that all unvaccinated persons (unless they previously have had small-pox) should very promptly be vaccinated; and re-vaccination should also be offered, both to persons above puberty, who have not been vaccinated since childhood, and to younger persons whose marks of vaccination are unsatisfactory.

17. It is always to be desired that the people should, as far as possible, know what real precautions they can take against the disease which threatens them; what vigilance is needful with regard to its early symptoms; and what, if any, special arrangements have been made for giving medical assistance within the district. Especially in the case of small-pox or of cholera, such information ought to be spread abroad by means of printed bills or placards. In any case where danger is great, house to house visitation, or personal inspection of all by discreet and competent persons, may be of the utmost service, both in quieting unreasonable alarm, and in leading or assisting the less educated and the destitute parts of the population to do what is needful for safety.

As addenda to these excellent memoranda, promulgated by Mr. Simon, the following rules, the observance of which is enjoined by the government of the London Fever Hospital, might well be adopted under similar circumstances in military and civil hospitals:—

1. It is of the utmost importance to the sick and their attendants that there be a constant admission of fresh air into the room, and especially about the patient's bed, care being taken to prevent the wind from blowing directly on the patient.

2. Attention to cleanliness is indispensable. The linen of the patient should be often changed, and the dirty clothes, &c., immediately put

into fresh cold water, and afterwards well washed. The floor of the room must be cleansed every day with a mop, and all discharges from the patient immediately removed, and the utensils washed.

3. Nurses and attendants ought to endeavour to avoid the patient's breath and the vapour from the discharges.

4. Visitors must not go near to the sick, nor remain with them longer than is absolutely necessary; they should not swallow their spittle, but clean the mouth and nostrils when they leave the room.

5. No dependence must be placed on vinegar, camphor, or other supposed preventives, which, without attention to cleanliness and admission of fresh air, are not only useless, but by their strong smell render it impossible to perceive when the room is filled with bad air or noxious vapours.

Processes of Disinfection.—These processes have been recommended by the late Professor Miller, of King's College, London. They cannot supply the place of cleanliness, ventilation, and drainage. They are artificial, and are used for exceptional purposes, the great natural disinfectant being *fresh air*, abundantly and uninterruptedly supplied.

1. For purposes of artificial disinfection, the agents which most commonly prove useful are—chloride of lime, quicklime, Condy's manganic compounds, and carbolic acid. Metallic salts, especially perchloride of iron, sulphate of iron, and chloride of zinc, are under some circumstances applicable. In certain cases chlorine gas or sulphurous acid gas may advantageously be used; and in certain other cases powdered charcoal or fresh earth.

2. If perchloride of iron or chloride of zinc be used, the common concentrated solution may be diluted with eight or ten times its bulk of water. Sulphate of iron or chloride of lime may be used in the preparation of a pound to a gallon of water, taking care that the water completely dissolves the sulphate of iron, or has the chloride of lime thoroughly mixed with it. Condy's stronger fluid (red) may be diluted with fifty times its bulk of water; his weaker fluid (green) with thirty times its bulk of water. Where the matters requiring to be disinfected are matters having an offensive smell, the disinfectant should be used till the smell has entirely ceased.

3. In the *ordinary emptying of privies or cesspools*, use may be made of perchloride of iron, of chloride of zinc, or of sulphate of iron. But where disease is present, it is best to use chloride of lime or Condy's fluid. Where it is desirable to disinfect before throwing away the evacuations from the bowels of persons suffering from certain diseases, the disinfectant should be put into the night-stool or bed-pan when about to be used by the patient.

4. *Heaps of manure* or of other *filth*, if it be impossible or inexpedient to remove them, should be covered to the depth of two or three inches with a layer of freshly burnt *vegetable* charcoal in powder. Freshly burnt lime may be used in the same way, but is less effectual than charcoal. If neither charcoal nor lime be at hand, the filth should be covered with a layer, some inches thick, of clean dry earth.

5. *Earth near dwellings*, if it has become offensive or foul by the soakage of decaying animal or vegetable matter, should be treated on the same plan.

6. *Drains and ditches* are best treated with chloride of lime, or with Condy's fluid, or with perchloride of iron. A pound of good chloride of lime will generally well suffice to disinfect 1,000 gallons of running sewage; but of course the quantity of disinfectant required will depend upon the amount of filth in the fluid to be disinfected.

7. *Linen and washing apparel* requiring to be disinfected, should, without delay, be set to soak in water containing, *per gallon*, about an ounce either of chloride of lime or of Condy's red fluid: the latter, as not being corrosive, is preferable. Or the articles in question may be plunged at once into boiling water, and afterwards, when at wash, be actually boiled in the washing water.

8. *Woollens, bedding, or clothing*, which cannot be washed, may be disinfected by exposure for two or more hours in chambers constructed for the purpose, and heated to a temperature of 210° to 250° Fahr.

9. For the disinfection of *interiors of houses*, the ceilings and walls should be whitewashed with quicklime. The wood-work should be well cleansed with soap and water, and subsequently washed with a solution of chloride of lime, about two ounces to the gallon.

10. *A room no longer occupied* may be disinfected by sulphurous acid gas or chlorine gas,—the first by burning in the room an ounce or two of flowers of sulphur in a pipkin; the second by setting in the room a dish containing a quarter of a pound of finely powdered black oxide of manganese, over which is poured half a pint of muriatic acid, previously mixed with a quarter of a pint of water. In either case the doors, chimney, and windows of the room must be kept carefully closed during the process, which lasts for several hours.

CHAPTER VI.

ON THE NATURE OF THE GENERAL DISEASES COMPREHENDED IN SECTION B.

WHILE the GENERAL diseases included in Section A (page 83) become developed in the human body under the direct influence of agents acting from *without*, the CONSTITUTIONAL diseases, which Section B (page 83) includes, may be said, by contrast, to become developed under the influence of agents generated *within* the body itself, through the continuous exercise of its functions in the daily course of nutrition, development, and growth. The original organization of the human body may be of such a kind that the continued and prolonged exercise of its functions, in place of preserving the system in a healthy state, ultimately brings about diseases of various kinds, which (from this mode of origin and development) have received the name of CONSTITUTIONAL DISEASES. All of them are eventually attended with more or less local manifestations of disease, some of so fixed a character, and so strongly expressed, that the local lesions are sometimes looked upon (although erroneously) as constituting distinct diseases; such, for instance, as the joint or heart affection in *rheumatism*, or the bone affection in *rickets*.

The CONSTITUTIONAL DISEASES are all associated with what is termed a *cachectic* state (*cachexia*), or, in common language, "a bad habit of body." They are sporadic diseases, and are sometimes discovered to be hereditary. The lesions which attend them are observed to be rarely limited to one part or organ; and, before death ensues, several organs, tissues, or apparatus, not necessarily contiguous to each other, become diseased, and new materials of a heterologous nature may grow up in their substance.

The course of *constitutional diseases* is generally a prolonged one; the tendency to repeated attacks or paroxysms of morbid action exists throughout life; and the local expressions of disease may ultimately assume a persistent or chronic type, complicated with and complicating diseases of another kind, and mutually overlaying or aggravating each other.

The primary implication of the constitution is, in the greater number of cases, sometimes demonstrable; but sometimes it can be stated only as a matter of fair induction, that the constitution is affected through the blood and the relation of the nutritive processes to it. The constitutional diseases are not traceable to the extrinsic action of a *virus*, and have none of the properties attached to infection. They are thus apparently generated, developed, and sustained under the influence of an intrinsic blood poison, the result of perversion of the nutritive or assimilative functions of the individual, and are frequently determined by congenital constitution or hereditary tendency. "It seems strongly probable, that each member of the group has its specific morbid principle in the blood, uninterchangeable with the rest, just as any one *virus* is uninterchangeable with others; and that, further, there may exist for each constitutional disease its specific curative agent—an antidote for each poison. In the greater number of these diseases a more or less obvious disposition may be traced to symmetrical arrangement of the anatomical characters of the local lesions, whether these be external or internal."

External physiognomical differences may generally be recognised as distinguishing one man from another, and due to the peculiarities of his own constitution— "*personal peculiarities*." These are due to what has been called "*temperament*," combined with that character of the constitution which tends to the repeated expression of some form of ill-health, always in the same way, and to which the name of *diathesis* has been given. Such external differences between man and man—such *personal peculiarities*—are known to be transmitted from parent to child, and are then said to be due to *hereditary transmission*. The *tendency* to the expression of certain forms of disease being thus born with such children, is said to be due to *hereditary predisposition*, and this tendency may be strong and evident, or it may be but feebly and faintly marked. In the former instance it will become expressed in the midst of circumstances even the most favourable to health. Another remarkable feature in the pathology of constitutional diseases is, that the transmission of the hereditary tendency may fail to be expressed in the *children* of a family liable to diseases known to be so transmitted, and yet the tendency may appear in the grandchildren. The tendency is thus expressed in *alternate generations*—the law of "*atavism*," as it has been called. The tendency, thus failing to appear in one generation, may lie dormant, and at last burst forth "in some collateral branch of the family tree;" thus proving that *tendencies* not obviously *expressed* by the parent may nevertheless be *transmitted* by him. A person therefore cannot be considered free from the inheritance of constitutional maladies simply because his parents may not have suffered from any of them; and now it is admitted that, under at least *three generations*, the investigation of hereditary tendency is uncertain.

When one only of the parents is the victim of constitutional disease, the tendency to similar constitutional disease is most obviously expressed in those children who most resemble that parent in physical conformation and appearance; and it has been observed that, when both parents suffer, the tendency will sometimes be expressed more often in the daughters of the family than in the sons, or more often in the sons than in the daughters.

It is especially to be noticed that a marked distinction ought to be made between those which are described as "CONSTITUTIONAL DISEASES" and those which are sometimes called "BLOOD DISEASES." The specific general diseases of Section A. may emphatically be termed "blood diseases"—diseases in which a poison from without affects the blood, and establishes a specific disease, like small-pox; but the *constitutional diseases* are "*blood diseases and something more.*" They not only exhibit an aptitude, possessed by those who suffer from them, to assume peculiar forms of morbid action, but their existence stamps upon every other morbid state with which they may be combined a most untoward effect. Exudations no longer proceed to healthy resolution. A chill, which otherwise in a healthy man would do no harm, is followed by rheumatic pains and swollen joints in one whose constitution tends to rheumatism, which is an example of a *constitutional disease;* or the growth of tubercle may commence in the lungs of one whose constitution is tuberculous. A bruise is followed by inflammation and an unhealthy suppuration, which has been termed scrofulous in those who are stamped with the diathesis of such a constitutional disease; while the influence of a constitution disposed to attacks of gout or rheumatism is very unfavourable for recovery from wounds, injuries, and other severe diseases. On the other hand, it is to be remembered, that local inflammations depending on a constitutional cause are sometimes remarkably fugitive and transient. So much is this the case that an idiopathic inflammation, such as a pneumonia or bronchitis, lasts, as we know, for several days; but it occasionally happens that local affections having all the characters of inflammation, will be suddenly established in persons labouring under constitutional *diathesis* or *cachexias*, and these inflammatory affections will run their course and terminate in as many hours as the others may take days—may appear at first even more formidable—but the very fact that they occur in a person suffering from rheumatism or gout enables one to give a more favourable prognosis of the immediate result, than would perhaps be warrantable in the case of a person otherwise healthy. This may appear paradoxical; but it is known as a matter of experience that when visceral inflammations appear in the train of rheumatism, for example, they run a materially more favourable course, as a general rule, than if generated under some other influence. This fact it is necessary to bear in mind during the examination of all cases of constitutional diseases, for it may help to explain many apparent anomalies amongst the diseases of this class.

Very complex and dangerous forms of disease result when the general diseases of Section A. (acute specific diseases) are complicated with the diathesis of the constitutional diseases of Section B. When they co-exist, they exercise an unfavourable reciprocal influence upon each other.

From the nature of the CONSTITUTIONAL DISEASES, it is to be noticed that there are three periods in the history of these diseases necessary to be recognised in the pathology and treatment of them.

The first period may be described as *the period of their constitutional development.* During this period the physician is rarely if ever consulted, unless a constitutional tendency to the disease is suspected, obvious, or perhaps hereditary.

The second period may be described as the period during which the *constitutional disease is fully expressed* by the phenomena and symptoms to be afterwards described as peculiar to each of them.

The third period in the history of these diseases may be described as a *series of intervals*, during which the health seems to be improved between the febrile paroxysms, or fully expressed conditions of ill-health.

It is for the cure of the fully expressed disease that the physician is generally consulted—a period when he knows he can do the least good. But when the public are aware of the extent to which health may be preserved, and constitutional diseases averted and mitigated by judicious management and treatment during the first and last periods here noticed, the physician will be more frequently consulted as to how the health is to be so preserved and improved as to ward off CONSTITUTIONAL DISEASES.

Whenever the physician has to treat any of these constitutional affections in their fully expressed condition, if he is successful in subduing the symptoms for the time, by means of the treatment to be mentioned under each of them, *the interval of comparative freedom from the paroxysmal expressions of disease is a time most precious, which ought not to be wasted, but which ought to be taken advantage of in preserving and improving the general health*, especially by—(1.) *Proper diet;* (2.) *the use of water;* (3.) *the judicious use of wines and other alcoholic beverages.*

CHAPTER VII.

DETAILED DESCRIPTION OF THE GENERAL DISEASES.—SECTION A.

SMALL-POX.

*Natural History**.—This disease is the product of a specific and palpable poison, which is reproduced and multiplied during the course of the malady. The poison is a material particle of extremely minute size contained in the contents of the pustules, and in the cutaneous and pulmonary excreta of small-pox patients. After a period of latency or incubation of from nine to twelve days, a remittent fever is established, followed by an eruption on the skin on the third day of the fever, or after about forty-eight hours' illness. This eruption sometimes also appears on the mucous surfaces. On the skin the eruption passes through the stages of papule, vesicle, pustule, and scab, leaving marks or cicatrices where the scabs have been. These scabs begin to form about the ninth day of the fever.

During the period of latency or incubation of small-pox—a period of nine to twelve days—there are no signs of indisposition; but when incubation is complete, fever commences, and follows a characteristic range of temperature. It commences with chills and repeated rigors or shivers, followed by the sensation of great heat, such that, the thermometer rising rapidly may indicate a temperature in the axilla of 104° to 106° Fahr., when the eruption can generally be felt commencing as hard pimples on passing the hand over the skin. Lassitude, headache, sickness, general aching and pain in the back accompany the fever. The pain in the back is so peculiar and striking a symptom, and more intense than in any other febrile affection, that it is often considered the only ailment, and may be mistaken for a sprain, for which relief is sought. It is distinguished from the pain of lumbago by its position in the central part of the *sacrum* and *lumbar* portion of the spinal column, and is uninfluenced by movement. The pain in lumbago affects the muscles in each side of the spine, and is greatly aggravated by movement. The persistence of vomiting forbodes a severe form of the disease. The face is suffused with redness, and the carotids pulsate strongly. There is usually much thirst, loss of appetite, and pain in the limbs. The tongue is coated, and the secretions of the mouth are slimy. On the evening of the third day after the illness begins, this fever, named the *primary fever* of small-pox, is at its height, the eruption then appearing, and what is known as the third stage commences.

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* See page 2 *ante* for a statement as to what the natural history of disease embraces.

The eruption, consisting of pimples or papulæ, first appears on the face, the neck, and the wrists; then on the trunk; and, lastly, on the lower extremities. The pimples gradually enlarge and ripen into vesicles; and then, suppuration being completed, pus may be seen in their summits. The pustules ripen about the ninth day after illness commences; they then tend to break, the matter oozing out, so that scabs or crusts are formed. These fall off after four or five days more—*i.e.*, during the third week of illness.

On the appearance of the eruption the fever remits, the heat abates, the temperature suddenly falling to 100° Fahr., the more urgent symptoms subside, and the pulse returns to its natural standard.

The number of pustules (*i.e.*, the amount of eruption) varies from tens to thousands, with the severity of the case.

The fourth stage, or that of secondary fever, commences with suppuration of the vesicles—*i.e.*, when they begin to fill with matter—about the seventh or eighth day. In about three more days this secondary fever is at its height. In those unprotected by vaccination, this period of secondary fever is a period of great danger.

Varieties of Small-pox.—Cases of small-pox are arranged in two groups:—

A. Unmodified or natural small-pox; and

B. Modified small-pox, in which the pustules are cut short in their development by vaccination or previous attacks of small-pox.

There are also varieties of the disease which apply to both groups, namely:—(*a.*) *Confluent* small-pox, in which the pustules run together over the greater part of the body. (*b.*) *Semi-confluent.* (*c.*) *Distinct* or *discrete*, in which all the pustules are separate. (*d.*) *Abortive* small-pox, or *varicelloid*, in which there are comparatively few pustules, the general eruption scarcely passing beyond the stage of vesicle.

Of these there are still *subordinate varieties*, namely:—

(*e.*) *Petechial.* (*f.*) *Hæmorrhagic*, in which blood is effused into the vesicles or pustules, with a tendency to hæmorrhages from the mucous surfaces. (*g.*) *Corymbose*, in which some of the pustules assume the form of clusters, like a bunch of grapes—a very rare variety of the disease.

Small-pox is apt to be complicated with or to be followed by *pleurisy, pleuro-pneumonia, glossitis, gastric and enteric catarrh, phlegmonous erysipelas, boils, carbuncles, erysipelas of head and face, pyæmia, or septicæmia, ophthalmia and ulceration of the cornea, purulent discharge from the ear,* often ending in *caries of the ear bones; hæmorrhages*, *renal congestion, with temporary or even persistent albuminuria; inflammation and suppuration of the kidney*, *cystitis*, *peritonitis*.

Diagnosis.—Small-pox may be confounded with *lumbago*, *febricula*, *measles*, *scarlet fever*, *lichen*, *varicella*, some of the *pustular eruptions of syphilis*, and in its very earliest stage with *erysipelas and typhus fever*. Hence it is necessary to study the natural history of each of these diseases in relation to the diagnosis of small-pox; and to wait the course of the eruption before giving a positive diagnosis from the symptoms alone.

Treatment.—The mildest cases, alike with severe ones, require rest in a bed without curtains, in a chamber not above 60° Fahr., and freely ventilated. The bed-clothing should be light, and the body-linen should be daily changed. In severe and long continued cases, the patient's back should be often examined, with the view of preventing sloughing of the skin. The hair should be shaven from the scalp as soon as possible, or cut off very close to the skin, so as to prevent matting over the pustules.

It has hitherto been the belief and orthodox teaching, that small-pox is not under the influence of any specific or antidote—that there is no remedy which will *cut short* the disease—that it must run its course, and that the physician can but try to assuage the untoward symptoms, and avert the dangerous accidents which may arise in the course of the disease. There are some grounds for modifying this belief. The chief physician of Iceland, Dr. J. Hjaltelin, has found that the action of *sulphurous acid gas* may be relied upon as a curative agent. He used it by way of fumigation, burning refined sulphur in the sick-room, so that the fumes of sulphurous acid came to be largely inhaled by the patient. At the same time he gave *sulphurous acid*, mixed with pure water, in the proportion of ʒi. to an ounce of water, repeated every hour. Such treatment had the effect of diminishing eruptive fever, and the vesicles dried up very quickly, leaving the skin covered with thin brown scales, which soon fell off.

The bowels should be well opened in the first instance, either by castor oil, or a saline purgative draught, or by a pill containing two grains of calomel and a grain of colocynth extract, one grain and a half of scammony, and a grain of gamboge, made consistent with an aromatic oil. During the prevalence of the fever stages, saline diaphoretics, such as James' powder, or the *aqua acetatis ammoniæ*, with $\frac{1}{16}$ of a grain of *tartar emetic* to every table-spoonful of the mixture; or a cooling mixture containing a drachm of *citrate of potash;* two drachms of spirits of nitrous ether in eight ounces of water, of which two tablespoonfuls may be taken every four hours. Lemonade, tamarinds, and such like drinks, cooled with ice, may be taken freely. To relieve the itching, the surface of the body may be sponged over with tepid water, containing a small quantity of sulphurous acid. Continuous delirium, restlessness, wakefulness, and a frequent pulse, towards the tenth or eleventh day, indicate the use of opium, which is best given in the form of ten to twelve grains of *Dover's powder* at bedtime; or *thirty* minims of *solution of muriate of morphia*, with or without one-eighth to one-fourth grain of *tartar emetic*, according as sleep seems to be prevented or not by irritation of the skin (see chap. vi., Part I., pages 72 to 77).

The bed-clothes should be changed frequently, and any scabs or crusts that can be collected should be burned. All linen should be disinfected by being put to steep in a tub of water for three or four hours, in which half an ounce of crystallized carbolic acid has been dissolved, and then dried in a chamber where the temperature can be raised to a great heat, or well *ironed* with a very hot iron.

Vaccination is the great preventive of small-pox, and has been rightly made compulsory by law within a certain time after birth, because, in proportion as it is *efficiently* performed, it greatly modifies the disease, so much so that *perfect* vaccination is almost absolute security against death from small-pox. It diminishes also the prevalence, extension, and force of epidemics of small-pox.

Re-vaccination should also be made compulsory at the age of ten years, or at puberty. Such re-vaccination would give to the community generally a well-grounded confidence in their protection, and so prevent constantly recurring panics about small-pox. To the individual it assures protection to such an extent, that it seems to prevent the occurrence of small-pox, more than even an attack of small-pox itself prevents the re-occurrence of that disease.

Cow-Pox.

Natural History.—Cow-pox is the product of a specific and palpable morbid poison, which is reproduced and multiplied during the course of the malady. The poison-germs are contained in the contents of the cow-pox vesicle, either as it occurs in the cow, or after vaccination in the human being.

After a definite period of incubation, a specific nodule or papule forms at the points of inoculation, which eventually passes through the stage of vesicle, pustule, and scab. On the fifth or sixth day, the stage of vesicle has been reached, and by the eighth day it is about the size of a lentil, having a central depression—an umbilication—with dissepiments. On the ninth day the contents become cloudy and whey-like, and a broad dark halo becomes developed round the vesicle. On the tenth day the contents are purulent, after which the pock gives way, and the contents begin to ooze out and dry up throughout its substance, forming a scab, which falls off about the end of the third week, or later.

The cicatrix which remains is peculiar, and distinctive of a vaccine scar. It is marked by a number of distinct *pits* over the surface where the scab has been—evidence of successful vaccination.

During the maturation of this specific and peculiar lesion, the adjoining lymphatic glands swell—a febrile state is induced, denoted by an increase of temperature in the axilla up to 104° Fahr., with constitutional disturbance of function and acceleration of pulse. A general lichenous, roseolar, or vesicular eruption may also appear on the trunk and limbs. The disease thus runs a definite course, affords immunity from another attack, and exercises a protective and modifying influence over the occurrence of small-pox; so that, practically, it is a complete protection against that disease, if well done in infancy, and repeated once or twice in the course of life. The operation of vaccination by the inoculation of *vaccine virus*, is ordained by law in this country to be performed within three months after birth, unless the child is not in a fit and proper state of health for the operation. Public vaccinators are also ordained to be appointed for different districts, and parents neglecting to procure vaccination, or failing after vaccination to have the child inspected, may be fined twenty shillings; and that any person practising inoculation with *variolous* or *small-pox* matter, or in any way wilfully producing small-pox in another individual, shall be liable to a month's imprisonment. (30 and 31 Victoria, 1867.)

The child ought to be at least from four to six weeks old at the time of vaccination; and in all vaccinations the vaccine lymph should be inoculated through four or five separate punctures, so as to produce four or five separate good-sized vesicles. The skin covering the insertion of the deltoid muscle is the place usually chosen for implanting the specific virus of *variola vaccinæ*.

Vaccination should be repeated once again towards puberty, and again, perhaps, in the course of life.

Chicken-Pox.

Natural History.—Chicken-pox consists of an eruption of vesicles occurring in a series of crops, usually appearing for several days in succession, so that dried up and fresh vesicles are often seen alongside of each other, on the back, breast, face, and extremities. The eruption is preceded by fever. This is one of the most frequent diseases of childhood, and derives an importance from its resemblance to cases of modified small-pox, rather than from any danger attending the disease. It is a disease, however, proven to be quite distinct from small-pox. After a period of incubation, said to vary from four to ten days, general discomfort, loss of appetite, gastric derangement, and headache, sometimes, also, chilliness, with pains in the back and limbs, precede the fever. Little spots, or papules, which soon become vesicles, constitute the eruption, which begins to appear over the trunk, and then on the face and limbs, when the fever has lasted from twenty-four to seventy-two hours. The eruption does not extend deeply into the skin, nor destroy its substance like the eruption of small-pox, unless much inflammation (generally from external causes) is set up around the vesicles. The eruption is vesicular on the first day; and by the second day the vesicles are filled with a whitish, straw-coloured lymph. On the third or fourth day they have attained their greatest magnitude, when they become acuminated, and immediately begin to dry up after bursting and shrivelling. The shape and structure of the vesicle are different from that of small-pox. It is not depressed in the centre, and contains only one compartment, not several.

Individual vesicles may be observed to develop in from six to twelve hours; and although the crops of vesicles may be limited to two or three, in some cases a succession of crops will occur every twenty-four hours, for ten, twelve, or fourteen days. On the fourth day the incrustation progresses rapidly, and in four or five more days the crusts fall off, leaving for a time a red spot on the skin.

A pit, depression, scar, or cicatrix may be left when the vesicle has gone on to the formation of pus, and where considerable inflammation has taken place around it.

Chicken-pox is a specific disease—*sui generis.* It occurs only once to the same person, and frequently it occurs in children who have never been vaccinated. Its occurrence in such cases does not prevent such children from taking small-pox, nor from being successfully vaccinated. Children, also, readily take chicken-pox who have been vaccinated, or who have had variola only a few weeks before. It is a very subtilly contagious disease.

Diagnosis.—As between *small-pox*, *lichen*, vesicular eruptions, such as *pemphigus and herpes*, it is necessary to study the distinctions.

Treatment ought to consist simply in a milk-diet, with stewed prunes or apples, and abstinence from animal food, careful attention to the bowels, rest in a cool room, and light bed-clothes. Cooling drinks may be required if much fever is present—such as *citrate of potash*, with orange syrup, in water, given three or four times a day (see chap. vi., Part I., pages 72 to 77).

MEASLES.

Natural History.—This disease (sometimes also called *rubeola* or *morbili*) is the product of a specific morbid poison, which is reproduced and multiplied during the course of the malady. The *contagia* are passed off in the exhalations from the patient.

After a period of latency or incubation of from ten to fourteen days, a continued fever commences suddenly, and very soon reaches a high temperature, 101° to 103° Fahr., with repeated rigors, and attended by catarrhal symptoms especially affecting the conjunctiva and air-passages. These symptoms are generally like those of a common cold. About the fourth day of this fever, or later, a characteristic eruption appears in crops of a crimson rash, consisting of slightly elevated minute hyperæmic dots, about the size of millet-seeds, and having a small papular centre, scarcely perceptible to the touch, without any feeling of hardness. Several of these dots of eruption may unite in irregular circular forms or crescents, or may remain isolated blotches of a raspberry colour. The eruption disappears on pressure, but soon returns again. The rash appears first on the forehead and face, and gradually extends downwards over the trunk and limbs. The eruption lasts six or seven days, beginning to fade about the seventh day on the forehead and face, succeeded by slight desquamation of the cuticle and slight itching. The whole duration of the disease is completed in from nine to twelve days.

The early symptoms are seldom severe, and greatly resemble those of an ordinary acute catarrh. They are shivering, lassitude, headache, derangement of the bowels (catarrhal), sometimes accompanied with nausea and vomiting. The fever may be very severe at the first onset, with a frequent and hard pulse, so that the patient seems to be abruptly or suddenly taken ill. The mucous membrane of the eyelids and nose become swollen—the eyes are suffused, and there is excessive lachrymation with intolerance of light, sneezing, sometimes epistaxis, cough, and dyspnœa. The cough is generally paroxysmal, hard, short, and barking, or croupy in its character, and does not remit till about the seventh day. Some sore throat may prevail, with redness of the fauces. Diarrhœa is also common.

The fever does not abate on the appearance of the eruption: it is oftener rather aggravated, and continues with an unabated severity till the eruption is fully out over the whole body. The catarrhal symptoms also continue to get worse as the eruption comes out.

In favourable cases the symptoms begin to decline from this period—the eruption fades and desquamation follows, the disease terminating on the ninth, tenth, or eleventh day from its commencement. The continuance of the fever, with persistence of the catarrhal symptoms, especially pectoral, denote an unfavourable case, in which bronchitis or pneumonia may supervene. In winter this is most apt to occur—most likely to be troublesome and even dangerous. Respiration becomes difficult—the blood is imperfectly oxygenated, and the eruption is apt to become livid or of a dark purple hue. The chief danger is from bronchial and pulmonary inflammation—a danger greater after the disease has begun to decline than during its progress. Cough may remain for weeks or months after desquamation is over, and may depend on bronchial catarrh or severe disease of the lungs, such as caseous transformation and disintegration of catarrhal-pneumonic products, with caseous degeneration of the bronchial glands, which may finally end in deposit of tubercle in the lungs.

Measles is also apt to be complicated with or to be followed by *inflammation of the larynx, croupous or diphtheritic, obstinate and chronic bronchial catarrh, capillary bronchitis, acute pneumonia, destructive lung diseases (tubercular or non-tubercular), purulent inflammations of the mucous membrane of the eyes, nose, and of the ear, stomatitis, chronic enlargements and inflammation of lymphatic glands—generally of the neck; enteric catarrh, acute Bright's disease, phlegmonous or gangranous inflammation of the genitals.*

Diagnosis.—Measles may be confounded with *a common catarrh, influenza, the eruption of typhus fever, early eruption of small-pox, especially if mixed with miliary vesicles, of scarlatina, of syphilis, or of flea-bites.* Hence it is necessary to study the natural history of each of these conditions, as they bear upon the diagnosis of measles.

Treatment.—An even and moderate temperature, not going below 60° Fahr., nor above 65° Fahr., ought to be maintained in the room. Fresh air should be continuously admitted, the patient being protected from cold draughts. Children suffering from measles require to be watched, so that they may not lay uncovered, especially during the night.

Mucilaginous drinks—such as linseed tea—gentle aperients, and mild diaphoretics, are indicated. Small doses of *Paregoric* with *ipecacuanha* wine will generally relieve the cough. The cooling mixtures prescribed in the treatment of small-pox and chicken-pox are also indicated here (see also chap. vi., Part I., pages 72 to 77). Milk diet, with stewed prunes or other fruit, ought to be given, to the exclusion of animal food. The patient ought to remain in bed while desquamation is going on. Protection from cold must be carefully adopted during convalescence, and the patient must not go out too soon. He ought to keep his room as long as catarrh exists. *Anæmia* is sure to attend the existence of the disease, and *quinine*, *iron*, and *cod-liver oil* are required, with animal food and sea-air.

Scarlet Fever.

Natural History.—Scarlet fever or scarlatina is the product of a specific morbid poison, which is reproduced, multiplied, and given off with the exhalations from the patient, and especially the epithelia, during the course of the disease. Fever begins after a period of latency or incubation of from four to nine days, and about the second day of the fever, or sometimes later, a scarlet efflorescence appears on the fauces and pharynx, and on the neck and face, which gradually spreads over the whole body, and begins to fade from the fifth to the seventh day; after which desquamation follows. The inflammation of the throat may be severe, and may extend to the submaxillary glands. The kidneys also are apt to suffer from renal congestion, attended with albuminuria (*desquamative nephritis*) and dropsy.

The disease begins with weariness, lassitude, and depression, or a feeling of sickness and slight indisposition; then follow shivering and headache, pains in the back and loins, loss of appetite, sickness, and white tongue, similar to the other eruptive diseases; and it is not till sore throat begins, and the skin becomes of a bright red colour, that the fever is recognised as that of scarlet fever. The disease is very often ushered in by severe vomiting. There is generally also sore throat, the back of the mouth and throat being of a reddish colour. Fever continues persistent as long as eruption continues, and as long as any inflammation of the throat exists. There is generally also great disturbance of the nervous system, indicated by great depression of the mental and physical powers of the body—a depression so great as sometimes to cause death before any throat affection or cutaneous eruption has had time to appear. Death has been known to take place in six hours from the commencement of the fever. Such cases seem to die from paralysis of the heart—perhaps from intense heat of the blood during the maximum of the fever. There are three varieties of scarlet fever, namely:—

(*a.*) *Simple scarlet fever*, in which there is a scarlet rash, with redness of the throat, but without ulceration.

(*b.*) *Anginose scarlet fever*, which is a more severe form of the disease with redness and ulceration of the throat, and a tendency to the formation of abscess in the neck.

(*c.*) *Malignant scarlet fever*, in which the throat tends to slough; the scarlet rash is scarcely if at all visible, petechiæ are often seen on the surface, and the fever is of a low type.

It is necessary to note also, that scarlet fever occurs occasionally without any rash or sore throat being observed. In all cases, however, it is a treacherous disease. The mildest cases may not seem to be serious in themselves, but are apt to be followed, it may be after the lapse of weeks, by evidence of kidney disease or of rheumatism.

The eruption consists at first of small bright-red puncta, dots, or maculæ, separated by interstices of healthy skin. These puncta or maculæ are at first very minute points, but quickly become confluent, so that in a few hours the redness becomes general over the skin. The redness disappears on pressure, and again returns from periphery to the centre on pressure being removed. The colour of the eruption is always brighter and more vivid in the flexure of the joints, and about the hips and loins, than in any other parts. It comes out all over about the same time, but is generally visible on the neck and chest before it appears on the face.

There are symptoms also which distinguish this fever from others. The pulse is small, weak, and rapid—120 to 130 beats a minute. The heat of skin is more ardent—104° to 105° Fahr., or higher. The higher the temperature the more serious the disease, especially if the eruption is intense and excessive. It rapidly reaches a very high maximum, and the defervescence is interrupted.

The appearance of the tongue also is characteristic. The papillæ are singularly elongated and enlarged, so as to stand up salient and erect, and of a deep scarlet colour, set in the midst of a thick, white, creamy mucous fur, which coats its surface. This appearance is sometimes described as the "strawberry tongue;" and the tip of the tongue is also of a similar vivid redness.

The condition of the urine should be carefully examined, especially during the period of convalescence. About the fifth day desquamation ought to commence, and it may extend over several weeks; and during this period the greatest care is needed, especially as regards protection from cold. It is during this period (and notably oftener after a mild than a severe attack), about the twenty-second or twenty-third day, that the unfavourable symptoms of suppressed action of the kidneys, albuminous urine, and dropsy are apt to set in. They commence with paleness of the countenance and redness of the face and eyelids; then the hands and feet swell, and general anasarca supervenes.

It is an *acute desquamative nephritis*, during which the poison of scarlet fever destroys the renal epithelium, when *serous* (tending to purulent) *inflammations*, in the form of *pleurisy*, *pericarditis or peritonitis* may occur; also *swelling of the larger joints* resembling *subacute rheumatism*, with pain on pressure; *passive dropsy*, *hæmaturia*, *œdema of the glottis*, progressive ulceration of the throat, and *diphtheria*, a tendency to *boils* and to swelling of the *parotid and lymphatic glands of the neck*, *intestinal catarrh*, *chronic inflammation of the eyelids*, *deafness* from inflammation extending up the Eustachian tubes to the membrane of the tympanum, and leading to suppurative destruction of the internal ear—conditions which may lead to *meningitis*, *cerebral abscess*, or *facial paralysis*,—*phlegmonous erysipelas with gangrene of the skin in large portions.*

Diagnosis.—Scarlet fever may be confounded with *dengue*, *rötheln* (hybrid between measles and scarlet fever), *typhoid fever*, *diphtheria*, *variola*, *measles*, *urticaria*, *erysipelas.* It is necessary, therefore, to study the natural history of each of these diseases, as bearing upon the diagnosis of scarlet fever.

Treatment.—In the mildest form of the disease the patient ought to remain in the house; and even when the symptoms are present in only a moderate degree, the patient should be kept in bed, and continue in bed for some time after the eruption has disappeared. It is particularly necessary to avoid exposure to cold. The bed-chamber should be kept at a uniform temperature, within the limits of 60° to 65° Fahr. The room should also be divested of carpets, curtains, and hair-stuffed furniture. Bare floors and wooden furniture should only be permitted in the bed-room. The skin of the patient should be sponged daily with tepid water, and carefully dried with soft cloths. Water, pure and cold, is the best drink; while soups of meat, stewed fruits, and milk ought to make up the diets.

When the symptoms indicate a severer form of the fever, small doses of *carbonate of ammonia* (three to seven grains) may be given every hour or every three hours; or the *liquor ammoniæ acetatis* may be given with an excess of *ammonia*—in proportion of three to five drops of *liquor ammonia* added to two fluid drachms of the former, in a sufficient quantity of distilled water, to be taken as a drink. *Chlorate of potash*, with *spirits of nitric ether*, may also be made into a mixture with water and syrup, and a suitable dose given every three or four hours. I have found the

TABLE I.—DISTINGUISHING CHARACTERISTICS OF SMALL-POX, COW-POX, CHICKEN-POX, MEASLES, AND SCARLET FEVER.

	SMALL-POX.	COW-POX.	CHICKEN-POX.	MEASLES.	SCARLET FEVER.
Incubation stage, . .	9 to 14 days.	2 to 3 days.	4 to 16 days.	10 to 14 days.	4 to 9 days.
Invasion stage, . .	Sudden pyrexia, tem. 104 to 106° Fahr. Central backache.	Symptomatic fever of maturation.	Slight pyrexia, headache, cough, for two or three days.	Sudden fever, rapid rise of tem. 101° to 103° Fahr., with *catarrh.*	Rapid rise of tem. to 104° Fahr. or more, with distinct chilliness, and sore throat.
Eurptive stage, . .	Eruption commences third or fourth day of invasion stage. Face, forehead, wrists, body, limbs—at its height on eighth day.	Sometimes a general rash.	Eruption of a few spots, then fresh crops every night or daily, for ten to fourteen days, between shoulders, over chest.	Commences on 4th day of fever, or even later, on face, forehead, trunk, and limbs.	Commences about second day of fever on the neck and upper part of chest, rapidly spreading to face, trunk, and limbs.
Characters of the Eruption, ...	Inflammation of true skin—formation of a papule, then a vesicle which passes into a *pustule*, and so forms a "pock." On second day the papule is flat on top, and is solid, hard, and dense like small shot; fifth day an umbilicated depression exists, and pus appears towards circumference. It ruptures or dries up and forms a scab, which separates from eleventh to fourteenth day, leaving a stain which disappears, or a pit which remains.	Papular elevation at seat of inoculation by second or third day; and by fifth or sixth day vesicles, surrounded by a circular inflamed areola by seventh or eighth day. The vesicle is in its most perfect state at eighth day, of a pearly colour, lustrous, and translucent. Contents clear and viscid, containing minute active particles of bioplasm—*the specific contagia* of cow-pox.	Slight papular hyperæmia, but not hard; and vesicular in a few hours, then opalescent with a faint areola. The vesicles rupture or dry up from the third to fifth day, when a scab forms, and a pit may be left, if the true skin has inflamed; otherwise no mark nor cicatrix is left.	Commences as small scattered red points, which enlarge to size of a millet seed or pea, having a papular centre. Tends to form crescentic patches or isolated blotches of a raspberry colour. It lasts for six or seven days, commencing to fade from the forehead about the seventh day. There is powdery desquamation of cuticle with itchiness.	Commences as minute bright red points, coalescing into patches—most distinct at flexures of joints, and colour most marked at the centre of each spot. The eruption is at its height about fourth or fifth day, and commences to fade from fifth to seventh day, after which desquamation commences. There is redness of fauces, with œdema and swelling.
Duration of eruption,					

gum resin of guaiacum of great service in subduing the inflammation of the throat. It may be prescribed in any one of the following formulæ:—℞. *Magnes Sulph.* ʒvi., *solve in Aqua.* ℥viii.; *adde Pulv. Guaiaci.* ʒiss.; *Pulv. g. Tragacanth co.* grs. xl. *Misce bene.* Dose:—A sixth part of this mixture every four hours till the bowels are freely moved Or, ℞. *Tinct. Guaiaci Ammon.* *f* ʒiss. to *f* ʒvi.; *Tinct. Cinchon. co* *f* ʒiss; *Potassæ Chloratis* gr. lxxx; *Mellis q. s. Aquæ ad.* ʒviii. *Misce.* Dose:—from a tea to a table-spoonful every hour or every four hours; or it may be given as an electuary, with *sulphur* and *cream of tartar* (one or other, or both) in *syrup of ginger.*

When the eruption has gone, and there is evidence of convalescence, the iron tonics should be at once commenced (see chap. iv., Part I., pages 72 to 77).

DENGUE.

Natural History.—A continued fever, or febricula, characterised by sudden severe frontal headache, and by severe pains in the limbs, small joints, and in the trunk; and sometimes by an eruption resembling that of measles. The disease is more peculiar to the East and West Indies and America; but has been seen in Spain and other European countries. The attack of dengue is sudden—almost to a minute. The patient may go to bed, apparently quite well, and wake up about two or three in the morning with a hot skin—so hot, that in a few hours the temperature in the axilla ranges from 99° to 103° Fahr., a pulse varying from 78 to 108, and a countenance indicative of utter helplessness and prostration. The fever is peculiar in the numerous daily remissions and exacerbations. Very often the first symptom is pain in the head, back, limbs, and small joints (which swell), with a feeling of faintness, giddiness, and weariness, so that the desire to lie down is overpowering. From the peculiar affection of the joints, the fever has been described as "arthritic." There may be a tendency to shiver, and in some epidemics distinct rigors, with hysterical symptoms in women and also in men, and convulsions in children. The average duration of this first febrile stage is about forty-eight hours (extremes, twelve hours to three or four days), when the symptoms begin gradually to subside; and a period of remission, of two to three days, occurs. During this period, general debility and muscular pains predominate, but without fever. On the fourth day there is generally a slight return of fever; and on the fifth or sixth day an exanthematous eruption appears, more like erysipelas than the eruption either of measles or scarlet fever.

The colour, however, is not so intense, and spreads over the whole body in forty-eight hours. The eruption is always most marked on the palms of the hands and soles of the feet; and beginning on the head and face, passes downwards.

When the eruption reaches its maximum, painful swellings of the lymphatic glands of the neck and occiput, axilla and groins, are common, and sometimes also of the testicles. According to Dr. Christie, of Zanzibar, the occipital glands invariably swell. With the swelling of the lymphatics, the mucous membrane of the mouth, nose, and throat becomes implicated—varying from mere redness to an extensive aphthous eruption, with considerable tumefaction of the lips and nose, conjoined with excessive pain—the mucous membrane becoming raw. The condition of the tongue varies greatly—generally it is coated, and with large papillæ. On the seventh or eighth day desquamation commences, and the acute stage terminates. The victims of dengue are to be commiserated for the horrible and agonising pains peculiar to the disease; but they are also to be reassured by the fact that the disease is of a non-fatal nature. The recurrence of the excruciating pains in the limbs, at a period long after subsidence of the fever, ought to be held in remembrance in any prognosis as to the probable duration of the illness. Swellings of the lymphatic glands of the neck, axilla, and groins, occur in many cases.

Diagnosis.—This disease may be confounded with *rheumatism*, or *scarlet fever*, or *erysipelas*.

Treatment.—Purgation is generally called for at the outset only, and is not to be continued.

Rhubarb, *soda*, and *calumba*, or *calomel*, or *colocynth*, or these *variously combined*, are the most efficient remedies—to be followed by doses of *quinine* of five to ten grains.

When the febrile symptoms subside, *iodide of potassium*, in four or five grain doses, has a very beneficial effect.

Belladonna, in the form of tincture, in medium doses, repeated every hour, is of great service in subduing the pain. The effect of this remedy requires to be watched (see chap. vi., Part I., pages 72 to 77).

TYPHUS FEVER.

Natural History.—This disease is the result of a specific morbid poison, which is reproduced, multiplied, and given off as *contagia*, in exhalations of the skin and lungs, during a continued fever, having an average duration of twenty-one days. The disease is characterised by an eruption of the skin, of a general dusky mottled rash, at first slightly elevated, and disappearing on pressure; but, after the second day of its appearance, persistent, and continuing persistent for eleven or twelve days. The eruption may appear from the third to the eighth day. The disease may terminate favourably from the thirteenth to the seventeenth day; and when it proves fatal, it is generally from the twelfth to the twentieth day. Languor and weariness are prominent from the first, gradually passing into sluggishness of intellect, confusion of thought, stupidity, oblivion, and complete prostration, somnolence, stupor, or coma. The advent of the disease is somewhat sudden, and the exact period of incubation is not determined exactly, but is believed to be usually about twelve days; in exceptional cases longer, and in many (about a third of the) cases, the period of incubation is less than twelve days; and occasionally the symptoms seem to commence at the instant of exposure to the poison. General soreness, uneasiness, and fatigue, loss of appetite and disturbed sleep, are prominent phenomena, by which the disease begins and advances gradually. Chilliness, sometimes amounting to rigor, may mark the commencement of the attack, and occur at irregular intervals, followed by heat of skin, cold sweats, general pains in the back and limbs, and frontal headache. This latter symptom is constant, and ceases about the tenth day, and always before the fourteenth. Sleep is disturbed by dreams, and is unrefreshing; and when not asleep, there is a consant tendency to heaviness and drowsiness. The mind ceases to think, and the attention cannot be fixed. The patient may lie with his eyes open, evidently awake, but indifferent or insensible to all going on around him. Bodily weakness is extreme, and the patient takes to bed, not unfrequently on the first day of illness. The exhaustion and prostration are great, and disproportionate to any muscular exertion that may have been taken. The eyes are dull and heavy, suffused and injected, or bloodshot, and a dusky flush overspreads the cheeks. Debility increases rapidly, and delirium generally supervenes. The eruption appears about the fifth to the seventh day, sometimes as early as the third. It consists of distinct maculæ or mulberry spots, and a subcuticular rash, deepest coloured on the most depending parts of the body. It first appears on the backs of the wrists, the borders of the axillæ, and about the epigastrium. In many cases it covers the whole trunk, the arms and legs. The spots are persistent after death. The tongue has a white fur at first, but at the termination of the first or commencement of the second week, has a large and swollen appearance, grows gray in the centre, and is moistened with a pale dirty-brown mucus. The pulse is quickened from the outset, and in dangerous cases it continues to increase in rapidity, ranging from 100 to 150. The temperature ranges from 102° to 104°, or even 107° Fahr., gradually and steadily rising, till it reaches its maximum generally on the fourth or fifth evening. The morning temperature is always lower than the evening.

Many complications and dangerous phenomena are apt to supervene—especially connected with the nervous system, the lungs, and the heart. These may be—*partial paralysis*, *bronchitis* of larger and smaller tubes, *hypostatic congestion of the lungs, passing into a low form of pneumonic consolidation*, *destructive lung disease, tending to gangrene, or to chronic phthisis*, *pleuritis*, *laryngitis*, *œdema glotidis*, *cardiac softening*, *phlegmasia dolens*, *erysipelas*, *abscesses*, *large sloughs* on parts pressed upon (buttocks, trunk, or extremities), *inflammation of parotid gland* or *submaxillary glands*, *dysentery*, *gangrene of the toes*, *nose*, *or fingers*, *or dropping off of the toe-nails*, *cancrum oris*, *suppuration of joints*, *pyæmia*, *renal disease.*

Diagnosis.—Typhus fever may be confounded with *enteric fever*, *meningitis*, *pneumonia*, *measles*, *small-pox*, *the plague*, *yellow fever*, *relapsing fever*, *delirium tremens*, *uræmia*, *pyæmia*, *glanders*, *or erysipelas.* The disease is always dangerous, and prognosis requires to be very guarded.

Treatment.—The object is to subdue excessive heat—to promote elimination, by insuring proper excretion—to sustain the action of the semi-paralysed nervous system, by sustaining the vital powers and obviating the tendency to death—to relieve distressing symptoms as they arise, and to avert and subdue local complications (see chap. vi., Part I., pages 72 to 77).

The use of the following therapeutic agents must be studied in regard to this disease, namely :—(1.) *water*—cold, tepid, and hot—in the form of baths, wet sheet packing, and sponging; (2.) *mineral acids*, especially *hydrochloric*, *nitric*, and *dilute sulphuric acid*, singly, or combined with *ether* and small doses of *quinine;* (3.) *opium* and *hydrate of chloral;* (4.) *alkaline salts*, *nitrate of potash*, and *bitartrate of potash;* (5.) tea and coffee; (6.) emetics, and especially the indications for and against their use.

The proper use of food, and the kinds of food best suited for the patient, are to be arranged for every case daily.

The proper use of alcohol in this disease is of the utmost importance to be learned; and there are few remedies which require more discrimination in their use. (See p. 75, *ante.*)

The patient must be exposed as much as possible to fresh air: in a cool, but not a cold, atmosphere, in a large well-ventilated room.

There is no disease which requires more constant and careful watching, or one in which the attentions of a well-instructed nurse are more necessary and valuable.

CEREBRO-SPINAL FEVER.

Natural History.—A malignant fever of sudden invasion, attended by painful contraction of the muscles of the neck and retraction of the head. In certain epidemics it has been accompanied by profuse purpuric eruption, and occasionally by secondary effusions into certain joints. Lesions of the brain, the spinal cord, and their membranes occur. The course of the disease is rapid, attended by great prostration of the powers of life, severe headache, and pain along the spine. The variations of temperature are so numerous, that no typical range has yet been obtained; and the result of the fever is generally fatal.

This disease is more than a simple meningitis. The whole of the nervous system is gravely implicated from the first; and some regard the disease as a variety merely of typhus fever, of influenza, or typhoid pneumonia, according to the nature of the predominating complications. The weight of evidence, however, seems at present to be in favour of considering this disease to be a substantive specific disorder, with certain constant symptoms, and apt to become epidemic. Premonitory symptoms are rare, but are usually slight headache with pain in the back; or uneasiness and weariness felt for several days before acute symptoms set in—the invasion of which is sudden. A chill may suddenly seize the patient, and shivering prevails, followed by intense vertigo, headache of intolerable severity, violent obstinate vomiting (cerebral), painful muscular stiffness, soon developing into tetanic contractions, particularly of the muscles of the neck and back. Distress in the head is constant, so long as consciousness lasts. The eyes express distress, the face is pale, the pupils are contracted, and the conjunctivæ red. Excessive restlessness and general muscular agitation prevail. The sensibility of surface is also so great that every touch or movement causes intense agony. These phenomena increase in severity up to the third or fourth day, when deglutition may become affected, and respiration (cerebral) irregular and imperfectly performed — the head being dragged tightly backwards on the neck, and the features fixed in the characteristic grin of lock-jaw. Delirium tends to stupor, and death generally takes place by coma or by apnœa from the fifth to the eighth day of the disease; otherwise the disease may continue for three or four weeks, and convalescence may be of many months' duration. The fever is generally remittent, with exacerbations expressed in sudden leaps of 1° or 1·5° Fahr., each of short duration. The highest temperatures prevail in the most rapidly fatal cases; but the maximum is generally below that of typhus, enteric, relapsing fever, and scarlatina. The pulse is not less varied than the temperature.

Diagnosis is between this disease and *typhus*, *typhoid fever*, *tetanus*, *meningitis*, *influenza*, *and typhoid pneumonia.*

Treatment.—Opium, *quinine*, the use of cold water and ice, have been the most useful therapeutic agents; and the principles which dictate the general management of fever and inflammation require special study in their application to this disease (see chap. vi., Part I.).

Enteric Fever.

Natural History.—This disease is the result of a specific morbid poison, which is reproduced, multiplied, and given off as *contagia* by the stools alone during the course of the illness. The emanations from these excreta may also contaminate the atmosphere, and the excreta may contaminate the water supply. The disease takes the form of a continued fever, associated with an eruption on the skin of rose-coloured spots, chiefly on the abdomen, appearing generally from the eighth to the twelfth day, occurring in crops, and each spot continuing visible for about three days. Languor and feebleness are prominent from the first, attended by headache, abdominal pains, and (early) by spontaneous diarrhœa. As the disease advances, diarrhœa increases; the discharges being liquid, copious, of a bright yellow colour, devoid of mucus, occasionally containing altered blood. In reaction the discharges are alkaline, and contain a large proportion of soluble salts and some albumen. The fever may terminate favourably by a gradual restoration to health during the fourth week. The average duration of the fever is about twenty-three days. In the majority of the fatal cases, death occurs towards the end of the third week. Special symptoms prevail which are characteristic of the special lesions peculiar to the fever—namely, fulness, resonance and tenderness of the abdomen, more or less tympanites of the intestines, with entire effacement of the natural lineaments of the belly; gurgling in the iliac fossæ, and increased splenic dulness. The specific lesions are enlargement of the spleen, mesenteric glands, enlargement and deposit in the glands of Peyer, and in the minute solitary glands of the small, and often also of the large intestine. These are the so-called "anatomical signs" of enteric fever; which is pre-eminently a disease of childhood and adolescence. It is the "*infantile remittent fever*" of infants and children, most common between five and nine years of age. In adolescence, the average age at which it mostly prevails is twenty-one.

The fever begins gradually, often indeed so very insidiously, that its commencement is not always able to be fixed. The period of incubation is therefore very difficult to determine. It is most commonly about two weeks; but it is often less, and may not exceed one or two days. Instances of longer duration appear to be more common than in typhus or relapsing fever. The fever is generally preceded by indefinite feelings of general illness, mental depression, great dulness and relaxation, loss of appetite, indigestion, restless sleep, disturbed by dreams, headache, dizziness, wandering pains in the limbs, and repeated epistaxis. Chills, rigors, or profuse diarrhœa, may also mark the onset of fever; and the early symptoms are those already stated. The countenance indicates anxiety, the mind continues clear and active at first, and when delirium sets in, the movements of the patient are generally active and vivacious; and he is disposed to leave his bed. The conjunctivæ are pale, the pupils dilated, the cheeks somewhat flushed, of a bright pink hue, more so towards evening; and epistaxis may frequently occur during the first week. The complexion does not get muddy, as in typhus. The belly enlarges, and is resonant on percussion, with gurgling on pressure in the right iliac fossa, where there is also often tenderness.

From the seventh to the fourteenth day the characteristic eruption appears. During the third week, the abdomen becomes more distended; the diarrhœa, which is catarrhal, increases, the stools amounting to five, eight, ten, or even twenty daily. In favourable cases they may not exceed three or four a day. They are liquid, of a pale brownish-yellow colour, with flocculi of an opaque, whitish-yellow colour floating through them like coarse bran, or like badly cooked pea-soup in which the meal is not pulped, and sinks in particles to the bottom of the containing vessel. As the patient loses strength these stools are passed involuntarily. Perforation of the bowels may occur during the third week, and hæmorrhage from the bowels is an occasional symptom. The pulse varies much from day to day. It is soft, feeble, and slow, relatively to the high temperature. Hence there is a great tendency to the development of bed-sores. Emaciation and anæmia may become excessive. The tongue, at first broad, moist, and red, ultimately becomes dry and coated with a pale brown fur, swollen and œdematous, so as to shew impressions of the teeth along the edges. This furred coating of the tongue generally cleans off after the fifth or sixth day, leaving a moist, red, smooth surface, inclined to dryness. Enlargement of the spleen is well marked towards the end of the first week. Pulmonic complication is not uncommon. Intellectual power is greatly impaired, and continues to be so, long after convalescence is established. No necessary connection exists between the intensity of the general symptoms and extent of intestinal mischief, or danger in the case. Relapses of all the symptoms not unfrequently supervene.

The typical range of temperature is characteristic of enteric fever. There are two sharply-bounded distinct periods, which correspond—(1) to the growth, and (2) to the reabsorption or subsequent changes of the material within the intestinal glands, and which correspond in point of time to the first and last half of the course of the disease. Important information as to prognosis is also to be derived from a careful watch of the temperature; and there is no disease in which prognosis is more uncertain, and the circumstances under which death may occur are extremely varied. Defervescence is remittent. The mode in which the lesions heal are peculiar, and there is a great tendency in this fever to the development of tubercle in the lungs.

The origin and modes of propagation of the disease require careful study in order to appreciate the means of prevention, and prescribing measures for checking the spread of the disease.

The complications and sequelæ of enteric fever may be—*pneumonia*, *pleurisy*, *acute* tuberculosis, *intestinal hæmorrhage*, *perforation*, *peritonitis*, *erysipelas*, *phlegmasia dolens*, *mental imbecility*, *paralysis*, *neuralgia*, *cutaneous hyperæsthesia*, *anæmia*, *debility*, *wasting contractions of the extremities, and rigidity of the muscles of the neck.*

Diagnosis.—The disorders with which typhoid fever may be confounded vary at different stages of the disease. Early in the affection it may be mistaken for *simple continued fever*, *relapsing fever*, or any one of the *exanthemata.* At a more advanced period it may be confounded with *typhus*, *and with typhoid conditions*, such as arise from *uræmia*, *pyœmia*, *general debility*, and *influenza;* also with *enteritis*, *peritonitis*, *meningitis*, *acute pulmonary diseases.* The natural history of each of these diseases must be studied in relation to their aptitude for being confounded with enteric fever.

Treatment aims at reducing temperature, subduing vascular excitement, general and local; restraining and moderating, but not actually suppressing or altogether checking the diarrhœa; stimulating and restoring the nervous system; obtaining free excretion from the kidney; and bringing about a gradual elimination (*without* ulceration) of the morbid growth from the intestinal glands (see chap. vi., Part I., pages 72 to 77)

Digitalis has been found of use in the severity of febrile excitement, in the form of *infusion* of fifteen to twenty grains in ten ounces of boiling water—consumed in the twenty-four hours. Cold and tepid sponging of the surface of the body, as well as the cold affusion, are also indicated. To restrain diarrhœa, *lime water* mixed with *boiled milk* (cooled with ice), in equal parts, is useful, refreshing, and nourishing. A tablespoonful of *chalk mixture*, with five or six drops of *laudanum*, may also check the diarrhœa, and its repetition requires careful watching. Moderate doses of *opium* alone may attain the same end. Enemata also may be used once or twice a day. These may be of ten to twenty minims of *laudanum* in an ounce of *starch mucilage;* or of water simply in which a little aniseed has been added, or of *assafœtida.* Dilute *hydrochloric or sulphuric acids* are also of service to the extent of xx to xxx minims, with one-fourth to one grain of *quinine*, in a draught every three or four hours; or a draught containing three minims of *Battley's Liq. Opii. Sedat.* may be given every four or six hours. *Acetate of lead*, *alum whey*, *Gallic acid*, *sulphate of copper*, or *nitrate of silver*, with *soap pill*, may also be resorted to, if the mineral acids are not tolerated by the stomach; and such remedies are also most useful in the stage of (atonic) ulceration of the bowel, or where hæmorrhage occurs from the bowels. In connection with this symptom, *turpentine*, in doses of ten to twenty minims, is a most valuable remedy given every hour in honey, or in an emulsion of yolk of egg or mucilage and sugar, or enclosed in capsules.

With a view of moderating the exudation in the glands of the intestines, and bringing about its evacuation with as little ulceration as possible, three agents have been found of use—

(1.) *Calomel*, commenced as early as possible (before ninth day), in doses of one or two grains twice daily; or minute doses of blue pill mass, a grain every two hours for twelve or more hours, according to its action, which requires to be closely watched.

(2.) Two or three grain doses of *iodide of potassium*, combined with ten or fifteen grains of *bicarbonate of potass*, are also worthy of notice.

(3.) Cold water compresses over the abdomen, changed two or three times a day, and fitting as closely as possible to the skin.

If sickness or hiccough are troublesome, *dilute hydrocyanic acid*, to the extent of i., ii., or iii. drops, in effervescing drink, may relieve the former, and *chloroform* or *chloral* the latter.

The diet requires to be carefully prescribed. Solid food must not be taken—beef-tea, arrow-root, mucilaginous broths, eggs, and milk are the best constituents of the food, variously combined. No flesh meat must be given till at least seven days after the febrile phenomena have passed away. It must always be remembered that the intestine may for a long time continue in a state of atonic ulceration, from which it slowly recovers; and in which any indiscretion as regards diet may rapidly set up a fatal inflammation.

With regard to prevention, the sources of drinking water must be carefully examined, to see that they have no direct or indirect communication with drains or cesspools conveying fœcal matter. It must also be seen that the overflow pipe of the water cistern, for domestic use, is not in communication with the sewage drains. These drains should be so ventilated that sewage gas or air cannot make its way into the house. All animal or vegetable matter in a state of putrefaction or decay ought to be removed from the surroundings of dwellings. The dejections and excreta of enteric fever patients ought to be at once disinfected, removed from the house, and buried in earth. A tea-spoonful of crude carbolic acid should be mixed with each motion; and some acid should always be suffered to remain in the water-closet pan.

Relapsing Fever.

Natural History.—This disease is the result of a specific disease-poison, which reproduces, multiplies, and propagates itself by *contagia*, emanating from the breath and exhalations during the course of a continued fever, having a very abrupt invasion and a short duration; but characterised by an abrupt relapse, occurring after an interval of about seven days of apparent health. There is no eruption on the skin. The fever is marked at the outset by rigors, chilliness, and severe headache, vomiting, and often jaundice; a white moist tongue, epigastric tenderness, confined bowels, enlarged liver and spleen, high-coloured urine, a frequent, full, and often bounding pulse, pains in the back and limbs, restlessness, and occasionally delirium. These symptoms abruptly terminate by an exceedingly copious perspiration, between the fifth and the eighth day, and after a complete apyretic interval (during which the patient may be so well as to get up and walk about), an abrupt relapse supervenes on the fourteenth day, counting from the first commencement of the fever. The relapse runs a similar course to that of the primary paroxysms, and terminates between the third and the eighth day. In some cases a second, third, fourth, and even a fifth relapse may occur. Death is very apt to happen from sudden syncope, especially after excessive perspiration or from suppression of urine and coma.

The period of incubation is not fixed, and is more variable than that of typhus. It is on the whole shorter than that of typhus; and occasionally, as in typhus, there is scarcely any latent period at all, the symptoms commencing almost immediately after the first exposure to the poison. Five, nine, twelve, and sixteen days are the periods of incubation which have been observed. The seizure is almost always sudden. Sometimes on waking in the morning, or when at business in the day, severe rigors at once come on, with extreme chilliness and frontal headache, much more severe in expression than in typhus. Febrile reaction quickly sets in, with a pulse so rapid as to range from 110° to 140° Fahr. The tongue is coated with a white fur; and often there is vomiting of green, bitter fluid, with epigastric tenderness and great thirst. In a large proportion of the cases there is decided jaundice, or bronzing of the skin. The pains in the muscles and joints are so severe as to resemble rheumatism. Temperature in the axilla ranges from 102° to 107° Fahr., accompanied with short rigors or slight sweating.

The thermometric phenomena differ from those of all other fevers. After the patient has continued in this fevered state for a period varying from five to eight days, a sudden change takes place, which is immediately preceded by an exacerbation of all the symptoms to an extreme degree, attended with great distress and restlessness. Suddenly a *crisis* ensues by a remarkable intermission of all the symptoms and a restoration to apparent health. This occurs generally on the *seventh* day, and its advent is rarely prolonged beyond the *eighth*. This *crisis* is commenced by a profuse perspiration; and occasionally a miliary eruption of vesicles covers the skin. More rarely the crisis is marked by epistaxis, as well as perspiration, or by profuse diarrhœa, catamenial discharge, or even hæmorrhage from the bowels. After either or several of those critical discharges have been established for a few hours, there is a complete and abrupt cessation of all the distressing symptoms, and the temperature may fall ten or twelve degrees in a few hours. The pulse quickly regains its normal standard, the tongue cleans, and the appetite and sleep return. Thus he may continue well for four or five days; although there are some who suffer greatly during this period from violent muscular pains in the limbs. During the crisis, also, symptoms of great depression are apt to come on.

About seven days after this critical change, or from the twelfth to the twentieth day after the commencement of the illness, and very generally on the fourteenth day, a sudden relapse occurs, which is a characteristic peculiarity of this fever. It seems in every respect a repetition of the phenomena of the first seizure.

In the interval of convalescence, or of remission between the first and second attack, the pulse may become slow to an extreme degree, even to forty-five beats a minute—a source of danger of death from sudden syncope—but the moment the relapse commences, it again rises to 120 or more. The crisis of the relapse is generally reached in four or five days, when convalescence commences. The fever is a very exhausting one, and the patients may remain sickly for months, with pallid anæmic countenances, puffed ankles, palpitation, extreme debility, noises in the ears, dimness of vision, diarrhœa or dysentery. Excessive pains in the limbs are also common, and the joints may swell.

Fatal or troublesome complications may be induced by the disease, such as lobular inflammation of the lungs, bronchitis during the intermission, abscess of spleen or kidney, dropsy, parotitis, and a peculiar form of ophthalmia preceded by amaurosis, œdema of feet and ankles, falling off of the hair, and sometimes desquamation of the cuticle in severe cases.

Diagnosis.—This cannot be made positively during the primary fever. It resembles *yellow*, *typhus* and *typhoid* fevers at first. It may also be mistaken for *acute rheumatism*, when pains prevail and joints swell.

Treatment.—Let the bowels be efficiently opened in the first instance, by *castor-oil* or *compound colocynth pill mass*, combined with *blue pill;* or by *blue pill* combined with *hyoscyamus* at night, followed by a saline draught in the morning; further active purgation is to be avoided. Vomiting is best subdued by five grains of *calomel* and one grain of *opium*, to be followed by the use of milk and lime-water as a drink, with ice. If the patient has been in good health and robust previous to the attack, the violence of the headache may be subdued by *leeches*. The action of the kidneys ought to be maintained throughout by small doses of *nitre*—one or two drachms dissolved in two pints of barley water, acidulated with a drachm of *dilute nitric acid*, and sweetened with syrup, may be used up during the twenty-four hours, with as much more water as may be agreeable. Alcoholic stimulants must be given if there is debility from the first, and anæmic murmur or fainting. The surface of the body should be frequently sponged over with cold or tepid water, and the patient ought to keep his bed during the interval before the relapse. (See chap. vi., part I., pages 72 to 77, *ante*).

SIMPLE CONTINUED FEVER.

Natural History.—This heading embraces "doubtful or anomalous cases" of continued fever, and many cases of an "uncertain character," which cannot be identified as of a specific nature, but running an uncomplicated course in from one to eight or ten days, of a continued type, but having no other specific character. Such fevers generally commence suddenly with chills, and often shivering, loss of appetite, and pains "all over."

Febricula is the name given to the simplest form of these continued fevers. It is a simple fever of very short duration, lasting as a rule for not more than twenty-four, thirty-six, forty-eight, or seventy-two hours, attended with a frequent, full, and often firm pulse, a white and coated tongue, pains in the loins and limbs, thirst, constipation, a scanty discharge of high-coloured urine, hot and dry skin, sometimes an eruption of roseola or erythema about the loins or thighs, coming and disappearing with the fever, severe headache, sometimes acute delirium and flushed face. The subsidence of the fever is generally associated with copious perspiration, or an eruption of herpes.

YELLOW FEVER.

Natural History.—This disease is the result of a specific disease-poison, which takes the form of a malignant fever of a continuous type, propagated by *contagia*, chiefly from the stomachal evacuations, and occurring only once during life. It is marked by yellowness of the conjunctivæ and skin, delirium, suppression of urine, interstitial hæmorrhages, and hæmorrhage from the stomach, mouth, nares, and rectum (black vomit, black stools), a slow and at times an intermittent pulse. This specific form of yellow fever is limited to very definite geographical limits, never having been known to propagate beyond 48° North latitude, nor under a temperature of 72° Fahr. at least. It has been imported into Lisbon, into St. Nazaire (in the department of the Lower Loire), into Plymouth, and into Southampton, where the imported cases have run their course and proved fatal. It has also been imported and become epidemic as far south as Monte Video. It has occurred as high as 4,000 feet above the sea level (Newcastle, in Jamaica). But, as a rule, it is endemic in low districts on the sea coast, and rarely occurs over an elevation of 2,500 feet above the sea.

This form of yellow fever is specific, and one *sui generis*, different from the remittent and intermittent fevers, in which the patient may become yellow, and from any other form of malarious yellow fever. The type of the fever is continuous, and not remittent. It occurs, as a rule, only once during life. It is propagated by specific *contagia* from infected persons or places to others. The period of incubation has been found to vary from two to eight or fourteen days; and it seems probable that the period of incubation tends to lengthen with the transportation and propagation of the disease into latitudes more remote from the equator. During this period the nervous symptoms are the most distressing.

The character and sequence of phenomena are not uniform, but vary somewhat in different epidemics; but the essential phenomena are those just mentioned. There is great irregularity in the temperature of the surface. Sometimes the forehead is the hottest part of the body, occasionally it is the chest. The uncovered parts in the later stages of the disease are very easily reduced in temperature, and may feel cool when the thermometer in the axilla indicates 102° or 103° Fahr. The highest temperature recorded has been 107° Fahr. in the axilla. Albumen generally appears in the urine on the second or third day; the discharge from the kidneys being deficient and dark in colour.

Dr. Lyons, who closely observed the progress of an epidemic of yellow fever in Lisbon, found the cases could be arranged into the following groups, namely:—algide, sthenic, hæmorrhagic, petechial, typhoid, each of which has the peculiar characteristics and complications indicated by these names.

The *diagnosis* of *true* or *specific yellow fever* mainly concerns its recognition and separation from *malarious yellow fever*.

Treatment.—The principal aim is to moderate excessive action in any one organ, and to endeavour to promote a crisis about the fifth day, which seems the natural period of resolution of the disease. The use of cold baths of enemata to unload the colon, and the subsequent use of medicine to keep the bowels open and to get the skin to act freely, are especially desirable. (See chap. vi., pp. 72 to 77, *ante*).

Turpentine has been used with advantage in subduing the hæmorrhagic tendencies. Food should be of the most bland, mucilaginous, demulcent description; and irritability of the stomach is the most difficult symptom to contend against—which four or five minims of *chloroform* will sometimes subdue, and prepare the stomach to receive and retain the food, which should be given in small quantities, with ice and cold drinks. *Chlorodyne* or a teaspoonful of *brandy* in milk, *creosote*, *milk* and *lime-water*, *hydrocyanic acid* may all in their turn be called for to subdue the vomiting.

PLAGUE.

Natural History.—This disease is the result of a specific disease-poison, which takes the form of a malignant fever, and which has prevailed at different times and places epidemically, attended with bubo or swellings of the inguinal and other lymphatic glands, and occasionally with carbuncles, pustules, spots, and petechiæ of various colours, and distributed in different parts of the body.

Lassitude, loss of strength, general uneasiness, and mental anxiety, followed by shivering, headache, vertigo, and vomiting, are the general symptoms at the outset; after which the characteristic buboes, carbuncles, and petechiæ appear, followed by delirium, coma, and generally death. The buboes of plague seldom maturate till the fever declines—about the eighth or ninth day—but may not open till between the fifteenth and twenty-seventh day.

The complications consist mainly of splenic congestion, with hæmorrhagic effusions into cavities.

Diagnosis of plague is mainly important in connection with its resemblance to *typhus fever*, with which it is believed to be identical.

Treatment is similar to that of typhus fever.

AGUE, OR INTERMITTENT FEVER.

Natural History.—This disease is the result of a specific disease-poison evolved from malarious places, and takes the form of febrile phenomena, occurring in paroxysms, which observe a certain regular succession, characterised by unnatural coolness, unnatural heat, and unnatural cutaneous discharge, which latter proves a temporary crisis, ushering in a remission. (See page 65, *ante*). These phenomena continue to be developed in an uninterrupted series or succession of paroxysms, more or less regular, which pass into each other by insensible steps, so long as the ague lasts. It is a form of malarious fever which was wont to be frequent in this country, and which is now rarely met with as endemic. The phenomena of the fever is commonly called "a fit of the ague." The paroxysm is usually of sudden invasion, or may be preceded by languor and debility. A cold stage begins—first with the extremities, then the back, and lastly the whole body; the nails turn blue, the features shrink, and become pale and sharp. The whole body, in severe cases, turns pale, shrivels up, and passes to a purple hue; and the surface of the skin assumes that rough state popularly named "goose-skinned." The coldness increasing, the motor nerves of the fifth pair become so affected that the teeth chatter, and eventually the tremors extend to every muscle, till the whole body shakes violently with the rigor. Cough, dyspnœa, and depression at the præcordia supervene, with a painful sensation round the temples and down the back. When nausea and vomiting begin, the hot stage soon follows, commencing by partial warmth or flushings. These gradually extend, and at length the whole body acquires a heat greater than natural —from 105° to 107° Fahr. The face may become swollen and preternaturally red, the heart and arteries beating with unusual violence, and all the distressing symptoms of a continued fever are present. The cold stage may last from half-an-hour to two hours and a half; the hot stage continues from three to eight hours. As the hot stage ends, and a crisis approaches, it is marked by a gentle moisture breaking out—first on the forehead and then extending over the whole body—so profuse as to soak the bed and linen as completely as if they had been dipped in water. The fever then gradually abates. Each paroxysm of ague is considered to commence and finish within twenty-four hours; but the duration varies in different types, which have been named *quotidian*, *tertian*, and *quartan agues*, according as the paroxysms repeat themselves every day, every third day, or every fourth day. When a paroxysm occurs daily, it may last about sixteen hours. When it recurs every third day, it may last ten hours; and when it occurs every fourth day, it lasts about six hours. (See page 65, *ante.*) Splenic, renal, and hepatic complications, with congestion of the stomach and duodenum, and black pigment in the blood, as well as in these viscera, are certain to supervene, and become persistent, if the patient be not removed from the pernicious influences which set up the disease.

Treatment.—*Quinine* is regarded as a specific in the cure of ague. It ought to be given in large doses during the sweating stage—twenty grains in a draught, dissolved in *dilute sulphuric acid*, to be continued in small doses during the intervals of freedom from fever for eight or ten days. *Arsenic*, in the form of *Fowler's solution*, is also a useful remedy.

REMITTENT FEVER.

Natural History.—The source of this disease is also referred to *malaria*. It takes the form of febrile phenomena, characterised by irregularly repeated exacerbations and remissions—the remissions being less distinct in proportion to the intensity of the fever. The fever is malarious. (See page 65, *ante.*) There is great intensity of headache, the pain darting with a sense of tension across the forehead. It is accompanied with functional disturbance of the liver, and frequently by yellowness of the skin. The malignant local fevers of warm climates are usually of this class.

This fever has many grades of intensity, varying from that of a severe intermittent or ague to a deadly malarious yellow fever. The usual chilliness, restlessness, lassitude, and depression usher in a paroxysm of remittent fever, to which the fever symptoms or hot stage soon succeed. Sometimes the attack is very sudden, so that, almost without any rigor, an intensely hot stage sets in, of much greater intensity than that which accompanies the worst forms of intermittent fever. The hot stage, or exacerbation, is generally at noon of the day, or early in the afternoon, and may continue throughout the night, subsiding towards morning, when, as a rule, remission is complete, and lasts for eight or ten hours. Each paroxysm may last for twenty-four or thirty-six hours, and may continue repeating itself for seven, fourteen, or twenty-one days, or longer—sometimes ending suddenly by crisis, or passing into an *asthenic* condition of the system, with more or less continuous and persistent fever—night-sweats and sleeplessness may end in hectic fever, or jaundice and dropsy may endanger life. The exacerbations are usually marked by much cerebral affection. Albumen is very rarely present in the urine, and is never persistent.

Diagnosis is mainly of importance as distinguishing this disease with yellowness of skin from true or specific yellow fever.

Treatment is similar to that of ague. *Quinine* is to be given during the periods of remission. If visceral congestion prevail, especially of the lungs, or if abdominal or cerebral oppression exist, it has been considered by some necessary to use the lancet, and to follow the blood-letting up by efficient purgation. Some, on the other hand, recommend *quinine*, to the exclusion of blood-letting, and trust entirely to purgation for relief of local congestions of the larger viscera. The evidence as to the good effects of blood-letting is exceedingly contradictory; but the preponderance of evidence seems daily to shew, that blood-letting gives only a very temporary relief, and that most alarming symptoms of extreme and dangerous depression were very apt to follow its use. At the same time there are cases of the so-called ardent fever of the Tropics in which life may be sacrificed by adopting less active measures than venesection. (See page 78, *ante.*)

SIMPLE CHOLERA.

Natural History.—This disease is usually the result of some irritant, as from unwholesome food, drink, or poison, or cold, and takes the form of an acute catarrhal inflammation of the mucous membrane of the stomach, which extends into the intestines, attended with nausea, retching, and vomiting, followed by severe watery diarrhœa, consisting of profuse transudation of fluid containing little albumen; the whole system generally is affected. This disease is apt to become epidemic in summer, towards its close, or in the beginning of autumn. The attack is often abrupt, as by a sudden seizure during the night. If during the day, nausea may exist with occasional pains of colic. Vomiting commences, and nausea increases. Much movement takes place in the intestines, and stools follow. Vomiting and purging, once commenced, recur in rapid succession, sometimes almost simultaneously; and enormous quantities of fluid are evacuated. Intense thirst results, and spasm and cramps may also occur.

Treatment.—After the stomach has completely discharged its contents—as it is sure to do—*opium* in solution, with *chloroform mixture*, is the kind of remedy most to be relied on; and when repeated, or aided by enemata containing *opium*, the effects of repetition of the drug must be carefully attended to. It is of importance here chiefly in its relation to the next disease to be described, namely,—

MALIGNANT CHOLERA.

Natural History.—A disease which is the result of a specific disease-poison, which reproduces and multiplies itself during the course of the malady. It propagates by *contagia* given off mainly, if not only by the stools, in which the poison multiplies even after their discharge; so that the stools become more virulent after they are passed, especially when mixed with water. The disease commences in many cases by premonitory diarrhœa, attended by sudden muscular debility, tremors, vertigo, and occasional nausea. Spasmodic griping pains pervade the bowels, with depression of the powers of respiration and circulation, and a sense of faintness and oppression in the præcordial region. A copious purging of serous fluid, like water in which rice has been washed, of alkaline reaction, and sometimes containing blood, is generally accompanied by vomiting and burning heat at the stomach, coldness and dampness of the whole surface of the body, lividity of lips, cold breath, an unquenchable thirst, a feeble, rapid pulse, difficult and oppressed respiration, with extreme restlessness, suppressed urine secretion, blueness of the whole body, a sunken and appalling countenance, a peculiarly suppressed voice, ending in fatal collapse, or in reaction and secondary fever.

This disease is also known by the names of *serous cholera*, *spasmodic cholera*, and *Asiatic cholera*. It exists at all seasons of the year among human beings inhabiting certain parts of India, which are regarded as the natural perennial or endemic area of the disease. Thence it is capable of being disseminated or propagated over the surface of the earth, through the atmosphere or in other ways, but chiefly by means of human intercourse between the healthy and the sick. Under certain favourable conditions, malignant cholera becomes epidemic alike in India and other regions of Asia, in Europe and America.

For a detailed statement of the several theories regarding the origin and occurrence of this disease, the reader is referred to my larger Text-book. It may be here stated, generally, that all the theories regarding cholera agree—(1.) in its being due to a specific poison; and (2.) in assigning an Eastern origin to this poison, which comes into existence among the hot, moist vapours of the wet, undrained, uncultivated deltas of the large rivers passing through the plains of Central India. Nearly all the theories also acknowledge the existence of certain meteorological and local conditions, or a predisposition in the inhabitants of infected districts as usually necessary to facilitate the spread, and give force and vitality to the poison.

The disease does not seem to be contagious in the sense in which small-pox and typhus fever are contagious. But all matters which the patient discharges from the stomach and bowels are infective, and become more infective by certain putrefactive processes. They are capable of setting up similar infective properties in other excremental matter with which they may come in contact. Hence, if they find access to drinking water in wells or reservoirs of water, large volumes of water may be thus contaminated by small quantities of the specific infective and putrescent material.

Regarding the details of morbid anatomy and condition of the blood seen in fatal cases of cholera, the reader must consult the larger Text-book. The subject is of importance as to the various views held regarding the treatment of the disease. Certain chemical changes are also undergone by the body during the progress of cholera, which also have an important bearing on the details of therapeutics.

The disease has many degrees of severity, and cases generally pass through three stages, namely—the premonitory diarrhœal stage, the cold, pulseless, or asphyxiate stage, and, thirdly, the febrile stage, if the other stages are outlived. The duration of the premonitory and cold stages varies from a few minutes to twelve, twenty-four, forty-eight, or more hours. The febrile stage lasts from four to eight, or more days.

The attack is commonly sudden—after a period of incubation, variously fixed at from thirty-six to sixty hours, up to three to fourteen days.

In this country diarrhœa generally precedes the marked symptoms by two or three days, in the slighter form of the disease; but all such cases of severe diarrhœa, during an epidemic of cholera, ought to be regarded practically as cases of cholera. The diarrhœa is all the more dangerous because it is painless.

Another, and worse variety of the disease, is seen in those cases in which, after two or three stools, severe and long-continued cramps come on, accompanied and followed by intense algide symptoms.

In the worst cases a mortal coldness comes on from the beginning.

The symptoms of the second, or febrile stage, are those (1.) of reaction, passing into (2.) a form of fever not dissimilar to that known as enteric or typhoid fever. This second stage is more usual in Europe and America, and nearly unknown in India.

The following series of phenomena are to be distinguished in typical cases of cholera in this country:—

(1.) Fæcal premonitory diarrhœa, passing into (2.) choleraic diarrhœa and vomiting, with rapid sinking of temperature, leading to (3.) asphyxia or collapse, when the lowest temperature is reached. (4.) Reaction, passing into (5.) a torpid stage, or secondary algide period, in which, although reaction has been established, the temperature still remains below the normal limits, and then gradually or suddenly rises to the normal average. (6.) A tepid stage, when the temperature rises to normal or above, and passes to (7.) the fully established secondary fever of typhoid type. The duration of the cholera process is from twenty to thirty hours.

The conditions which complicate the cases of the patients who survive the first and second stages are mainly *consecutive fevers*, *gastritis*, with vomiting, *acute desquamation*, *nephritis*, with anæmia; *enteritis*, with diphtheritic exudation extending especially upwards through the small bowel from the ileo-colic valve; *dysentery*, *pneumonia*, *pleurisy*.

Diagnosis is mainly concerned with distinguishing true *malignant cholera* from *simple cholera*, or *diarrhœa* due to causes different from the cholera-poison. During an epidemic all cases of diarrhœa should be looked upon with suspicion, regarded as serious, and treated as if they might turn out to be cholera.

Treatment.—Three periods are to be provided for—(1.) The period of diarrhœa; (2.) the algide period, or period of collapse; (3.) the period of reaction.

To check or arrest the diarrhœa is the practical result aimed at by a variety of formulæ of remedies, and those in which *opium* is the main remedy have obtained the greatest amount of confidence. *It is not to be given if any signs of collapse exist; but if the evacuations are still fœcal, a full dose ought to be given.* Stimulants are called for during the stage of collapse, and as soon as any flagging of the pulse is observed, brandy in iced water and champagne should be given in small quantities, as frequently repeated as the condition of the pulse dictates. Subcutaneous injection by solutions of *camphor* and of *ammonia* have also been of service. Cold compresses over the abdomen are also of service in collapse. Water, pure and cold, may be allowed freely, and still more freely when re-action sets in—when food of the blandest kind and most liquid form should be given in regulated quantities. Much is yet to be hoped for, in the way of prevention, through improvement of the sanitary condition of India, especially in those localities within the endemic area of the disease.

DIPHTHERIA.

Natural History.—This disease is the result of a specific disease-poison, which is reproduced and multiplied in the system during the course of the illness, which is characterised by the formation of a membranous exudation on a mucous surface—generally that of the mouth, fauces, or air-passages—or occasionally on the surface of a wound, attended with extreme prostration and the early occurrence of albumen in the urine, which may only continue for a very short time, or become persistent. In many cases, a remarkable series of nervous phenomena are apt to supervene, characterised by progressive paralysis, and sometimes by fatal syncope. The disease is contagious, and apt to be epidemic.

This disease has been, and still is sometimes confounded with *croup*, on the one hand, and with *malignant scarlet fever*, on the other. There is no doubt a form of croup due to diphtheria—diphtheria in the larynx—constituting *croupal diphtheria*, or diphtheria with the local symptoms of croup; while, on the other hand, there is evidence to shew that true croup is a disease *sui generis*, and different from diphtheria.

The general or local symptoms may predominate in certain cases, or even in certain epidemics. Sometimes the patient may die from the malignancy of the general symptoms, the specific fever, or from the severity of the local lesion. At first there is mere redness, and swelling of some part of the mucous membrane within the mouth. The normal secretion becomes viscid and adherent. A whitish-gray patch, forming on some part of the swollen membrane, indicates the commencing layer of lymph, which may thus spread from one or several centres over the reddened surface. Thus the lymph may sometimes extend continuously from the nares to the bronchi, moulding itself to the forms and tortuosities of the nasal passages. If the lymph is forcibly removed, a raw bleeding surface is exposed, which in a few hours is again covered with a new layer of lymph; and it is this exudation, together with the specific constitutional symptoms of general infection, which establishes the disease as one *sui generis*. The exudation quickly dies, together with the interstitial tissue at the surface; so that there is sometimes a superficial ulceration, without gangrene, from which an unhealthy discharge flows; hence the fœtid effluvia proceeding from the mouth in cases of diphtheria.

The consistence of the lymph varies greatly, from a creamy substance to a wash-leather-like tenacious substance. Vegetable growths (fungi) are not uncommon in the pellicle of diphtheria; but their presence is quite accidental, and no evidence that epiphytes have any essential connection with cases of diphtheria.

The lymphatic glands are especially affected, to which the lymphatics of the pharynx lead. They become inflamed, and their enlargement may be felt behind the angle of the lower jaw on either side, as well as down the neck, by the sides of the larynx.

Cases of diphtheria have been grouped by Sir William Jenner into six varieties, namely:—

(1.) *The mild form*, in which the general and local symptoms are trifling, and no sequelæ follow.

(2.) *Inflammatory diphtheria*, when symptoms of severe cynanche pharangea precede the exudation of lymph. The mucous membrane over the arches of the palate, the uvula, and the tonsils, is swollen, and of a dusky red hue, and there is œdema of the submucous tissue. Swallowing is generally impossible, on account of pain and swelling. In from twelve to forty-eight hours a layer of lymph coats the affected surface, the pulse becomes weak, with evidence of increasing prostration, albumen in the urine, swollen, hot, and tender joints.

(3.) *Insidious form of diphtheria*, in which laryngeal symptoms supervene, and death rapidly follows from suffocation—a form of disease which may be confounded with primary croup.

(4.) *Nasal diphtheria*, in which a sanious discharge from the nose comes on after febrile disturbance of a low type, the glands of the neck begin to swell, the arches of the palate and tonsils become red and swollen, muco-purulent bubbles of fluid issue in quantity from the narrowing isthmus of the fauces.

(5.) *Primary laryngeal diphtheria* commences with painful deglutition, attended by redness and swelling of the mucous membrane of the pharynx, arches of the palate, uvula, and soft palate. Laryngeal symptoms rapidly set in, and death threatens from *apnœa*.

(6.) *Asthenic diphtheria* may begin with general and local symptoms of very moderate severity, but threatens death from the severe constitutional disturbance—the pulse very soon becoming rapid and feeble, with an extreme sense of prostration.

The duration of cases of diphtheria varies from forty-eight hours to fourteen days; but local lesions and sequelæ may prolong the illness to weeks or months.

Amongst the sequelæ, phenomena due to derangement of the nerve centres are peculiar and characteristic, which supervene after an apparent convalescence of a few days to several weeks. The most alarming symptoms are referable to the heart, whose beats become feeble and slow, so that death is apt to supervene from syncope, or from coagulation of blood within the heart or pulmonary artery.

In other cases paralysis is more widely spread, and is progressive. Several sets of muscles may become paralysed, commencing generally with the faucial and pharyngeal. Voice and swallowing both become markedly impaired. The sight also may fail, then the muscles of the lips, and those of the upper and lower extremities and of the bladder. Anæsthesia co-exists in the mucous membrane of the fauces and pharynx. Such cases generally terminate favourably.

Albumen (with fibrinous casts and blood) is found in the urine in many, if not in all cases, and its quantity is sometimes so great as to cause the whole amount of urine to become solid by heat and nitric acid; and, like other pyrexiæ, diphtheria is attended with a marked increase in the excretion of urea.

The period of incubation of the poison of diphtheria may be thirty hours or less.

Diagnosis.—Croup and *scarlet fever* are the two diseases with which diphtheria is apt to be confounded, as well as *aphtha* and *herpes.*

Treatment.—Such saline medicines as exert a slight action on the skin and kidneys may be required at first, but a rapid pulse generally indicates the necessity of alcoholic stimulation. No specific treatment can cure the disease; but the local application of a solution of *nitrate of silver* in the proportion of *twenty grains* to *a fluid drachm of* water (as recommended by Sir William Jenner), is of great importance. The application should be once for all thorough and efficient, being painted round and over the patches with a brush; while the surface round the exudation may be touched with the *solid nitrate of silver.* Equal parts of *hydrochloric acid* and water may be similarly used. Gargles are also of use, such as *glycerine* containing *tincture of the muriate of iron* or *chlorate of potash*, *carbolic acid*, or *Condy's fluid.* Tracheotomy or laryngotomy may be required (General Treatment, see page 77 *ante*). *Tincture of the muriate of iron* should be given in frequently repeated small doses in the fluid, used as a drink, so that a full dose may be taken, at least, six or eight times a day.

Hooping-Cough.

Natural History.—This disease is the result of a specific disease-poison, multiplying and reproducing itself during the illness, and propagating itself by *contagia*, emanating especially from the breath and general exhalations from the body; even before the characteristic "whoop" is expressed.

The illness is preceded and accompanied by fever of variable intensity, attended in the first instance by catarrh, and subsequently by paroxysmal fits of convulsive coughing; which occur in numerous, short, rapid spasmodic movements of forcible expiration, suddenly followed by a prolonged and deep inspiration, marked by a characteristic sound, commonly known as a "hoop," "whoop," or "kink." These sounds may recur several times before the fit ends, and then a quantity of mucus is generally brought up from the lungs or stomach, or the contents of the stomach are evacuated.

In the majority of cases the disease commences as a simple catarrh, to which the specific and characteristic nervous elements of the disease are afterwards superadded to the catarrh. The specific catarrh of hooping-cough may sometimes be distinguished from an ordinary cold by the combination of intense fever, with the secretion of a viscid mucus from the bronchial mucous membrane, repeated *paroxysms* of coughing recurring several times in a minute, and continuing for many days—even for as many as six or eight weeks. In some cases the nervous element of the disease is most marked from the first as a kind of hiccough, or "spasms in the throat," from the efforts to *in*spire.

The immediate and continued effects of the paroxysms are to interrupt the free transmission of blood through the lungs, and the return of the blood from the vessels of the head.

Our knowledge of the period of incubation of hooping-cough is imperfect. After exposure to contagion, it is five or six days before symptoms of catarrh are observed.

The complications of hooping-cough are usually *bronchitis* sometimes *capillary*, *collapse of lobules of the lungs*, *with emphysema*, *pneumonia*, *pleurisy*, *phthisis*, *croup*, *convulsions*, *cerebral apoplexy*, *vomiting*, and sometimes *measles*, or other specific fevers.

Treatment.—Attention to diet and the action of the bowels are necessary. Boiled apples in milk is a useful form of food; and no animal food should be allowed in the acute catarrhal stage. Sedative remedies, such as *belladonna*, *hyoscyamus*, *opium*, have each in their way been of service; but no narcotic possesses any specific power in controlling the paroxysms of the disease. *Belladonna* has acquired a repute as the most efficient sedative; and to a child under four years of age one-eighth or one-tenth of a grain of the extract may be given, with the same quantity of the powder of the leaves made into a pill, to be dissolved in syrup at the time it is given.

Cochineal is an anodyne which also gives relief. I have found it of marked benefit in cases where the child was losing flesh from constant vomiting, as a result of paroxysms of coughing. This tendency to vomit has always disappeared under its use.

MUMPS.

Natural History.—This disease is the result of a specific disease-poison, which reproduces and multiplies itself during the illness of the patient, and propagates itself by *contagia* given forth from the secretions of the mouth. It takes the form of a specific inflammation of the parotid and salivary glands, whence come the contagia; and sometimes the disease is epidemic. *Ptyalism* or *salivation* is common.

It occurs most commonly in male children, less frequent after than before puberty, and second attacks are rare. The *idiopathic parotitis* of mumps is to be distinguished from *symptomatic parotitis*, which so often occurs during the course of severe fevers, and tends to purulent infiltration of the gland, with suppuration of the interstitial tissue. It is also sometimes symptomatic of ptyalism from the poisonous action of *iodine* and *mercury*. The *idiopathic parotitis* of mumps rarely proceeds to suppuration. Epidemics of mumps usually occur in spring and autumn, during cold and damp weather. The disease commences as a catarrhal affection of the gland ducts of the parotid. The testicles in boys and the region of the ovaries and mammæ in girls may be the seat of pain and swelling. Febrile phenomena precede the local symptoms, but pain on moving the jaw soon sets in, so that mastication becomes impossible in severe cases. The tonsils and submaxillary glands are sometimes affected. The pain and swelling ought to subside about the fifth or sixth day.

Treatment.—It is necessary to maintain a gentle, but constant flow from the bowels by saline cathartics. The painful parts require fomentation. Absolute rest, with a farinaceous diet, must be enjoined; and no irritating applications (such as *iodine*) ought to be applied to the swollen glands.

INFLUENZA.

Natural History.—It is the result of a specific disease-poison, which is reproduced and multiplies itself during the malady, and propagates itself by *contagia* given forth in the breath and general emanations from the patient. The disease takes the form of a specific catarrhal inflammation of the mucous membrane of the air passages, with severe constitutional disturbance—lassitude and prostration to an extreme degree.

Influenza frequently prevails as an epidemic, and is attended with early implication of the naso-laryngo-bronchial mucous membrane. Chills occur, and great sensibility to cold exists over the whole surface of the skin. The conjunctivæ are injected, and the eyes tend to fill with tears. The nostrils discharge an acrid fluid. There is fixed and intense pain in the head, mostly frontal over the eyes, sometimes also attended with giddiness. The nights become sleepless, with delirium or lethargy. Cough prevails, with a yellow expectoration—most troublesome at night, and tending greatly to increase the headache. The febrile state continues from four to eight days, and sometimes gives place to diarrhœa more or less persistent. The sense of taste is generally greatly disordered, and there is a feeling of great anxiety and depression existing over the region of the heart. This specific catarrhal fever is not limited to man. A similar disease has been epizoötic amongst horses and dogs especially. The period of incubation varies from two days to as many weeks. The fever is remittent, with exacerbations in the evening. Pulmonary complications may occur in the forms of—(1.) capillary bronchitis; (2.) bronchitis supervening on tubercular disease of the lungs; (3.) bronchitis with disease of the heart or aorta; (4.) pneumonia.

Diagnosis is mainly as distinguishing influenza from typhoid fever and non-specific catarrhs of the air passages.

Treatment.—*Blood-letting* cannot be borne. It has always been hurtful. A gentle dose of *calomel* (one to three grains), followed by a saline purgative, brings away dark-coloured motions, relieves the great depression of spirits, and tends to reduce temperature. Emetics are to be avoided. *Nitrate of potash*, greatly diluted and mixed with lemon juice and sugar, is a most useful drink. *Ipecacuanha wine* in full doses relieves the bronchial catarrh, and may be combined with *conium* and *camphor;* and an emetic may be necessary to relieve the air-tubes of retained secretion.

GLANDERS.

Natural History.—This disease is the result of a palpable disease-poison, which is reproduced and multiplied in the system of the patient during the course of the illness, and is propagated by *contagia* emanating mainly from the secretions of the nasal mucous membrane. It takes the form of a specific catarrhal inflammation of the nasal passages developed by contagia from the nasal secretions of a glandered horse.

It is a febrile disease of a malignant type, characterised by vascular injection of the nasal mucous membrane, from which an aqueous, viscid, glutinous, or purulent discharge proceeds. Chancre-like sores form on the nasal membrane, which extend into the frontal sinus and neighbourhood. All animals having an undivided hoof—the horse, the ass, and the mule—are liable to this disease. In *glanders*, the nasal passages especially suffer; in *farcy*, it is the lymphatics and lymphatic glands which are mainly affected. Acute glanders is expressed by primary fever, with pains in the joints and limbs like rheumatism. An eruption on the face, trunk, limbs, and genital organs, about the twelfth day, is one of the most remarkable symptoms of acute glanders—described as glander-pustules. Profuse fœtid sweats precede and accompany this eruption. If bullæ form, death of the skin takes place, more or less extensive and deep. The period of incubation in man is from two to eight days.

Treatment.—Diaphoresis by *Dover's powder*, and large doses of *opium* are required to relieve pain; the bowels being freely opened at the outset.

FARCY.

Natural History.—This disease is also the result of a palpable specific disease-poison, which reproduces and multiplies in the system of the patient during his illness. It takes the form of an inflammatory affection of the skin and of the absorbent system, produced by the contagion of matter from the horse, ass, or mule having farcy.

Some regard this disease as a form of glanders. There is general inflammation of the lymphatic vessels and glands, ending in the formation of soft, small tumors under the skin, known as "farcy buds," or "farcy buttons." These gradually suppurate, and the secretion from the open sores contains the specific *virus* or *contagia* of farcy. The "buds," "buttons," or tumors, are characteristic, and form on different parts of the body—as on the head, neck, and extremities—and especially the hinder extremities of the horse. There is no involvement of or discharge from the mucous membrane of the nose, as in glanders.

Equinia Mitis.

Natural History.—A pustular eruption, produced by the contagion of matter from a horse affected with "*the grease*," is characteristic of this disease. Grease in horses is a specific inflammation of the sebaceous glands of the skin in or about the heels. There is first a catarrh from these glands, and the secretion which flows gives forth a very loathsome smell. The catarrh gradually passes to ulceration, giving rise to unhealthy sores—deep, raw, and excessively tender cracks or fissures, with an offensive discharge.

The catarrhal discharge is the most virulent, and produces a pustular eruption on the skin of man very similar to *ecthyma*, elevated above the skin, and with a red, purple, tumid base, attended with febrile symptoms, with very marked depression and tremors, much foulness of tongue, rapid pulse, and alternate heats and chills. The eruption becomes pustular in about eight days—the pus being watery and abnormal. In ten or twelve days the eruptions die away, and scabs form, which, falling off, leave well-defined scars.

Treatment.—Frequent purgation with *aloes*, combined with *ammonia*, and such moist local applications as tend to relieve pain, give the greatest relief to the constitutional symptoms. Tonics and stimulating treatment are required to aid convalescence.

Malignant Pustule.

Natural History.—A spreading gangrenous inflammation, commencing as a vesicle on some uncovered part of the skin, attended with peculiar hardness and fœtor. The *contagia* emanate from cattle similarly diseased.

The specific poison implanted on the exposed skin produces, in the first instance, a redness like the bite of a gnat, and afterwards a minute vesicle. The lesion rapidly spreads, and involves the neighbouring tissues, which become hard, black, and gangrenous. Crops of secondary vesicles form round an erysipelatous-like areola, chains of lymphatics become inflamed, the breath is fetid, and death follows with all the indications of septic poisoning.

The disease has been long known in this country as an epizoötic amongst English live stock, under the names of "*joint murrain*," "*black quarter*," "*quarter evil*," and "*blood*"—"*charbon*," *quartier*, and "*sang*" of the French, and *milzbrand* of the Germans.

Diagnosis is important, as distinguishing the disease from simple boil.

Treatment.—The progress of the disease can only be averted by the use of caustics, such as *potassa fusa*, applied to the spot, when to the uninformed its aspect is still trivial, appearing like a common boil.

PHAGEDENA.

Natural History.—A condition of wounds or ulcers, in which loss of substance spreads or extends with a sloughy surface. The condition betokens general ill-health and constitutional disturbance, with great debility, loaded tongue, and fetid breath. The local lesion in the wound or ulcer is a special form of mortification or gangrene, the destruction of tissue advancing by molecular death, and much more rapidly than in a simply spreading ulcer. There is a more severe form of the disease when combined with sloughs, and known as "sloughing phagedena."

Treatment.—The general health must be improved, either by the removal of the patient from the place in which this specific morbid condition was set up, or by the improvement of his surroundings, specially as regards food, air, and water.

HOSPITAL GANGRENE.

Natural History.—Sloughing phagedena occurs as an epidemic in hospitals; and usually starts from a syphilitic sore. This is the most severe form of phagedena, and there is constitutional evidence of blood-poisoning, *toxæmia*, or *septicæmia.* It is presumed that some specific poison is generated by the decomposition of discharges on the surface of the wound or sore—absorbable gases or other products being liberated, which influence the condition of the blood passing through the diseased parts, tending to bring about its coagulation in the living vessels. The morbid condition is mostly apt to be set up where cancellous bone structure has suffered injury, as in compound fractures, or after the surgical procedures of amputation or resection, especially if the injured bones are large, or where vein trunks have been involved in traumatic inflammation, as in gun-shot wounds. Its occurrence is intimately connected with impurity of air—at a certain point of which it and *erysipelas* very commonly appear—the appearance of either being, in fact, a condemnation of the sanitary condition of a ward or house.

ERYSIPELAS.

Natural History.—A specific characteristic of erysipelas is the "diffuseness" of the inflammation of the integument, tending to spread indefinitely, and to involve the areolar tissue beneath the skin. Hence also the tendency to complication in the form of inflammation of membranous coverings of viscera, such as the meninges of the brain and the pleuræ; or to spread to the gastro-intestinal respiratory mucous surfaces by the throat or larynx. Lymphatic vessels and glands are also implicated; and there is free fluid effusion, producing soft œdema. Renal congestion or inflammation may also co-exist. The disease may become epidemic, spreading by *contagia* from person to person. The poison of erysipelas (whatever it may be) is most apt to enter the system by an open wound, as by inoculation. It poisons the blood, as in pyæmia, and there is great constitutional disturbance. But the fever differs from some other specific fevers, such as scarlet fever or measles, in this respect, that one attack does not protect the system from another; on the contrary, once erysipelas occurs, in some constitutions it seems very apt to occur again. The disease also occurs in some without any previous local injury, beyond exposure to cold or damp. The febrile attack may be sudden, by rigors, irregular flushings, pains, quick pulse, white tongue, nausea, vomiting, and deranged bowels. Sore throat, with lymphatic complications, is an early and constant accompaniment. The range of temperature is very similar to that of measles, but there are important differences. Numerous varieties of erysipelas are described, namely:—(1.) *erratic;* (2.) *phlegmonous erysipelas;* (3.) *gangrenous erysipelas.* The period of incubation appears to vary from ten to fourteen days; and at all periods of life erysipelas is a dangerous and deceitful disease.

Diagnosis is mainly at first to distinguish the disease from other specific fevers, and afterwards from *erythema* and *acute eczema.*

Treatment.—The indications point to rest, saline laxatives, cooling drinks, and a stimulating, nutritious diet. Where gastro-intestinal disturbance exists, *rhubarb*, *soda*, and *calumba* in small doses, frequently repeated, are of great service to keep the bowels gently open, and improve their secretions. *Tincture of the muriate of iron*, in full doses of thirty to forty minims, every three or four hours; *quinine* and *ammonia*, or *ammonia* and *cinchona infusion*, with *alcoholic stimulants*, are the remedies to be depended on.

The affected parts must be covered with *cotton wool*, after being dusted over with *flour* or *oxide of zinc powder*. Wet appliances are to be avoided.

PYÆMIA.

Natural History.—A specific febrile condition generally, but not always sequent on suppurative inflammation of wounds of the soft parts, or of bone, the puerperal state, or surgical operations—or after periostitis, necrosis, carbuncles, boils. It may also occur in cases in which there is no open wound or abrasion of any kind. It results in the formation of secondary abscesses (often multiple) in the internal visceral organs (most frequently in the lungs, the liver, the kidneys, spleen, and brain), also in the joint cavities and connective tissue; sometimes, but not necessarily, it is associated with phlebitis or embolism. *Septicæmia* is a state of the blood without secondary abscesses—a form of pyæmia where fever is intense, and constitutional disturbance from blood-poison great.

It may also occur from the softening of clots or during endocarditis, ulceration of the intestines, as in dysentery, urinary abscesses, hæmorrhoids, dissection wounds. The febrile condition characteristic of pyæmia appears to be set up by the introduction into the living tissues, and eventually into the blood, of a specific poison which is itself a product of (suppurative and infective) inflammation. The blood is altered in this respect, that it contains bacteria, and is more transparent and darker by reflected light than normal blood. The disease is very rapid in its progress, and in the most severe cases the fever is apt to be followed by rapid collapse and death (*septicæmia*, or rather *ichorrhæmia—i.e.*, poisoning of the blood from *ichor* or decomposing pus, or a specific infective product of inflammation). The nature of the poison of pyæmia (as recently shewn by Dr. Sanderson) consists in the following characters:—(1.) Every pyæmic abscess contains a poison which, when introduced into the circulation, or into a serous cavity, sets up the phenomena of pyæmia. (2.) The product of this specific inflammation may be so mild in its action that it produces no marked symptoms when first introduced into the body; but by cultivation it becomes intensified, as when a pyæmic liquid is transferred to the peritoneum of, say, a guinea-pig, it may not produce any very marked symptoms in the animal itself; but when fluid from the peritoneal cavity of this infected animal is taken and injected into another, the toxic intensity of this transudation liquid is increased to the most deadly activity. The products of such infective inflammation abound in bacteria, but it is not proven that such bacteria are the efficient causes of pyæmia. Their presence seems to characterise the products of infective inflammations from those which are not infective, and their abundance affords an indication of the degree of infectiveness, and their presence in the blood is an indication of that constitutional disturbance which accompanies infective inflammation.

The specific fever of pyæmia generally commences suddenly, with intense recurrent rigors from the third to the fifth day after injury or operation. The nervous phenomena and type of fever are essentially typhoid. (See page 66, *ante.*) Profuse perspirations, with extremely high temperature (104° Fahr.), generally mark the commencement of the secondary suppurations—metastatic multiple abscesses. These are the more remote and accidental results of the disease, and may occur either in the internal organs or underneath the skin. The pus of these abscesses is infective—containing a poison, such that when introduced into the circulation or serous cavity, will reproduce pyæmia. The pus also contains bacteria. A peculiar odour, extremely sickening and heavy, is given off by the perspiration. Mental depression is extreme.

Diagnosis.—The use of the thermometer after operations is all-important, and it is often necessary to distinguish the suppurative fever of pyæmia from such diseases as *meningitis*, *bronchitis*, *pneumonia*, *typhus*, *icterus*, *enteric fever*, *intermittent fever*, *gonorrhœal rheumatism*, *erysipelas*, and *hectic fever*. At the same time, it must be remembered that any of these diseases may be the cause of pyæmia, independently of any wound or external injury. Prognosis is doubtful in all cases, as the disease is one of the most fatal —the danger and rapidity of fatal termination being in proportion to the rapidity of recurrence of the rigors and their severity.

Treatment.—Free exposure of the patient to abundant fresh and pure air, nutritious food, stimulants and tonics, at frequent and regular intervals, afford the best prospects of recovery. *Quinine*, in very large (*i.e.*, 30 grain) doses, every three or four hours, or administered subcutaneously, is a hopeful remedy. *Mineral acids* and *iron* are the most suitable tonics.

PUERPERAL FEVER.

Natural History.—A continued fever, communicable by contagion, occurring in connection with child-birth, and often associated with extensive local lesions, especially of the uterine system. The most important local lesions following this form of continued fever are —*peritonitis*, *effusions into serous and synovial cavities*, *phlebitis*, and *diffuse suppurations*. There is great depression of the powers of life, and constitutional disturbance may be so great that death may ensue, leaving no anatomical sign of disease. There is blood-poisoning, of the nature of the erysipelatous blood-poison; and, in fact, erysipelas and puerperal fever seem to be mutually interchangeable. The disease is also sometimes set up by the poisons of *measles*, *scarlet fever*, *diphtheria*, *typhus* and *typhoid fevers*, or decomposing conditions of the lochiæ and vaginal discharges.

Increase of body temperature, followed by rigors, from the third to the fifth day after delivery, are the earliest indications of puerperal fever; subsequent to which there is tenderness over the whole surface of the abdomen, or limited to the lower half. The pulse increases in rapidity, ranging from 120 to 160, or more. Respiration becomes short and rapid. Thirst is distressing, and not unfrequently nausea and vomiting.

The lochial discharge is generally suppressed or altered in character, and the flow of milk ceases. Diarrhœa and tympanitic distension of the bowels add to the distress.

The *treatment* must have reference to the conditions which appear to have set up the disease; but the remedies are similar to those already noted in the previous diseases, such as erysipelas and pyæmia.

PUERPERAL EPHEMERA, OR WEED.

Natural History.—A fever consisting of one or more paroxysms, occurring a few days after delivery, generally attended by diminution of the milk and lochia, and unaccompanied by local lesions.

This disease approaches in type to malarious fever of the intermittent form, of short duration, and often regarded as a feverish cold or chill. It is rare before the seventh day after delivery; and is most apt to occur in a humid malarious atmosphere, especially in low, marshy, thinly populated districts, or where stagnant ditches intersect houses, or where dwellings have been erected over rubbish thrown into shallow pools.

Increase of temperature, with rigors and perspiration, are the earliest indications of this disease—which derives importance from its alarming resemblance to the onset of pyæmia or puerperal fever. The rigors are usually of great severity and long continuance, attended with more or less pains in the head, the back, and extremities. Depression is great. The features shrink; they appear pinched, and the eyeballs sink back in their sockets. The fingers may have a livid, shrivelled aspect, as in the chill of an ague. The pulse is feeble, and but slightly accelerated. The secretions are arrested. Depression of spirits, with hysterical phenomena, are apt to prevail; and delirium may supervene.

Profuse perspiration usually betokens a crisis, when the patient begins to get well. The secretions are restored and flow freely, and the patient gets quiet and restoring sleep.

Treatment consists in restoring warmth till the stage of chilliness has passed away; restoration of arrested secretion by suitable remedies, and subsequently tonics and nutritious diet during convalescence.

CHAPTER VIII.

DETAILED DESCRIPTION OF THE GENERAL DISEASES COMPREHENDED IN SECTION B.

The diseases of this section comprehend, "*for the most part, disorders which are apt to invade different parts of the same body simultaneously or in succession.*" They are sometimes spoken of as "*constitutional diseases,*" and they often manifest "*a tendency to transmission by inheritance.*" (See chap. vi., p. 120, *ante.*)

Acute Rheumatism, or Rheumatic Fever.

Natural History.—A specific febrile disorder attending a morbid state of the system, which is the result of a constitutional development, and which is also expressed by inflammation of a peculiar and nonsuppurative kind in the fibrous tissues about or surrounding the joints, especially in the white fibrous tissues, such as the *sheaths* of the *muscles* and *muscular fibre-tendons*, *aponeurosis*, *bursæ*, *capsular ligaments*, *periosteum*, *and pericardium.* Many joints may be affected at the same time or in succession. The various local phenomena have a tendency to shift from part to part, the most remote from each other; and the febrile state is accompanied by profuse acid excretions from the skin, by the separation in some cases of large quantities of uric and sulphuric acid through the kidneys, and by a highly fibrinous condition of the blood.

The poison of rheumatism does not seem to be absorbed from without—rather, it is presumed that some morbid matter is generated by the body, and not eliminated during the ordinary functions of life, and that its pernicious action is cumulative.

There is evidence of the abnormal state of the blood, and there are several circumstances which point to the constitutional origin of the disease, especially the complications affecting internal organs, which are part of the disease. One of the results of acute rheumatism is to thicken the parts affected, and to cause opposing surfaces to adhere; and very rarely does the inflammation of rheumatism advance to suppuration. The parts most commonly affected are the joints. But the valvular apparatus of the heart, its fibro-serous covering, the strong white glistening sac of the pericardium, are also parts which are apt to suffer—and that independently of joint affection. Fibroid degeneration of the valves of the heart is another lesion which may insidiously result, without any articular symptoms of rheumatism. It slowly advances from year to year, and ultimately the kidneys may be found implicated as a form of Bright's disease. *Pulmonary affections*, in the form of *bronchitis*, *pneumonia*, or *pleurisy*, or the three combined, are also apt to form an element of complication in the disease.

There are certain varieties of rheumatism, named as follows:—

(1.) Acute rheumatism. (2.) Subacute rheumatism. (3.) Gonorrhœal rheumatism. (4.) Synovial rheumatism. (5.) Muscular rheumatism in the local varieties of (*a.*) Lumbago, (*b.*) Stiff-neck, (*c.*) Pleurodynia, (*d.*) Chronic pains, stiffness, and swellings of joints.

Fever generally precedes, for twenty-four to forty-eight hours, the local symptoms of acute rheumatism. It is well marked, and the patient feels "out of sorts" and sensitive to atmospheric vicissitudes. He is pale, complexion sallow, the eye dull, and conjunctiva generally yellow. With great heat of skin (100° to 103° Fahr., or more) there are copious and often local perspirations, invariably acid, and of a disagreeable sour odour, and the pains are always more excessive if this perspiration does not occur. The urine is scanty, of high specific gravity, deeply pigmented, depositing deep-coloured sediments of uric acid. The urea is generally augmented. The water is lessened, and the solids are increased, chiefly in the form of urea and pigments. There is great thirst, also generally constipation; tongue white and furred, saliva acid, with a bad taste in the mouth. The ranges of temperature in cases of rheumatism are peculiar, shewing remarkable and extreme differences in different cases. Those cases are in great danger where temperature rises to 105° Fahr. This fever generally continues from ten to fourteen days, and the duration of cases of rheumatism average from *four* to *five*, or even *six* weeks; but mild cases may not continue ill longer than ten days or a fortnight.

Diagnosis.—The disease has to be distinguished from the affections of the joints in *relapsing fever*, from the *pains experienced* at the commencement of several of the *acute specific fevers*, from *gout*, *erysipelas*, *pyæmia*, *glanders*, *trichinosis*, and *dengue*.

Treatment.—As a rule, in a person otherwise healthy, the disease tends to terminate favourably—if uncomplicated.

The use of large *blisters* round the limbs and close to the affected joints, followed by large *linseed poultices*, to promote discharge of serum from the blistered surface, gives speedy relief to pain, and may shorten the attack. A free purgation with *calomel* and *compound jalap powder* ought to precede any general treatment; after which, *saline purgatives*, to secure one free action of the bowels daily, ought to be prescribed.

High temperatures (*e.g.*, 105° Fahr.) ought to be reduced by the use of the *bath* at a temperature of 95° to 98°, which ought to be gradually lowered to 70° Fahr. *Opium*, *chlorodyne*, and *hydrate of chloral*, with or without *belladona*, are of great value in making the patient comfortable and free from pain. *Alkalies* or the *neutral salts* are of great value as constitutional means of relief. *Nitrate of potash*, *iodide of potassium*, *phosphate of ammonia*, *hydrochlorate of ammonia*, *quinine*, and *cinchona bark*, combined or not with *alkalies* or *ammonia*, *tincture of the muriate of iron*, *phosphate of iron*, *guaiacum*, combined or not with *sulphur* and *cream of tartar* (essentials in the composition of the well-known remedy for "pains" called the "Chelsea Pensioner"), are all remedies of varied usefulness, according to the nature of the case, and the constitution and habits of the patient, which appear to have brought about the attack. The tendency of the disease will also, to some extent, indicate the line of treatment to be adopted—as, for instance, in the use of those remedies which act upon the heart—such as *aconite*, *digitalis*, *colchicum*, and *veratrum veride.* The patient must be made as comfortable as possible by perfect rest, envelopment in woollen blankets or in cotton wool, anodyne fomentations, or poultices, or spongiopiline charged with *opium* or *belladonna.* Regulation of food and of habits is of great importance in the intevals of health to improve the constitution and prevent repeated attacks. (See page 123, *ante.*)

GONORRHŒAL RHEUMATISM.

Natural History.—An affection analogous to acute rheumatism, but associated with or consequent on gonorrhœa.

It attacks patients who never suffer from rheumatism, except when they contract gonorrhœa, and sometimes it recurs in the same patient with every gonorrhœa he contracts. It commences either when the discharge continues profuse, or when it has been more or less speedily suppressed, or after it has quite disappeared. The parts affected are generally the knee-joints, or the knee, ankle, and toe of one side. Rheumatic ophthalmia, as *sclerotitis*, is not unfrequent at the same time. When it extends to more joints than one, the first affected joint does not recover its normal condition, but continues after other joints have been implicated. It is rare for the heart to suffer. The sheaths of the great sciatic nerve sometimes suffer, when the pain along the course of the nerve is very obstinate (*gonorrhœal sciatica*). Women rarely suffer.

Treatment.—*Rest*, with *anodyne fomentations* of the affected joints, and *opium* internally.

SYNOVIAL RHEUMATISM.

Natural history.—A rheumatic affection, in which an accumulation of non-purulent fluid occurs in some synovial sac, especially that of the knee-joint. One joint, generally, is alone affected, and the synovia is altered as to quality. Great irritation exists in the surrounding tissues; and structural changes are apt to occur in the capsule of the joint—sometimes eventually involving the cartilages and joint-ends of the bones.

MUSCULAR RHEUMATISM.

Natural History.—Pains in muscular structures (probably due to inflammation of fibrous sheaths) increased by motion. *Lumbago*, *stiff-neck*, and *pleurodynia*, are the three principal local forms of this affection.

Lumbago affects the sheaths of the fleshy mass of the lumbar muscles, on one or both sides of the loins, often extending to the ligaments of the sacrum and ilium. The pain is severe, and generally of very sudden occurrence.

Stiff-neck, or *cervical rheumatism*, generally follows exposure to currents of cold air on the neck, and affects especially the sterno-cleido-mastoid muscle of one side; and hence the immovable twist of the head to one side, with great pain on movement.

Muscular rheumatism may also affect the muscles of the chest (pectorals, intercostals, insertions of serratus magnus), simulating pleurisy, and hence known as a form of *pleurodynia*, affecting especially the infra-axillary region, the chief pains being localised in one point, increased on pressure at that point, and of a catching character, so as to prevent a complete respiratory act.

Treatment is by local appliances which ensure rest and warmth—such as in *lumbago*, strapping the back from the level of the "seat" upwards, in imbricated layers of broad stripes of adhesive plaister (*emplas. roborans*) spread on doeskin, the back being exposed before a large fire during the process; or over the affected side in *pleurodynia*, from mid-spine to mid-sternum, and over all a flannel bandage. Subcutaneous injection with *morphia* gives great relief; but if used for the first time, it must be used with great caution in patients above forty years of age.

Rhubarb, *soda*, and *calumba* powder at bed-time may be required to improve stomachal digestion; and an electuary of *guaiacum*, *sulphur*, and *cream of tartar*, in equal parts, with *syrup of ginger* (one or two teaspoonfuls, in a claret glass of water, in the morning), will tend to improve the secretions from the bowels.

CHRONIC RHEUMATISM.

Natural History.—This is one of the most common forms of rheumatic disease. The knee, ankle, hip, elbow, or shoulder joint are those which usually suffer from chronic pain, stiffness, and swelling. The soreness, stiffness, and pain generally extend from the joint, along the fibrous structures, to a greater or less extent, the whole limb thus becoming the seat of severe pain. Commencing generally in the aponeurotic expansions of these large joints, the affection is apt to pass to the *periosteum*, and to induce there and in the interior of the joints such a chronic morbid action as in some cases occasions the removal of the synovial membrane and cartilages, while a procelain-like substance comes to supply the place of the cartilage, having a polished surface, without any elasticity of cartilage, and destitute of secreting power, from being destitute of synovial structures. It is especially prone to attack those joints or places which had previously been the seats of dislocation, contusion, or other severe injury. The affected textures all become finally thickened, they lose their flexibility, becoming impaired in tone and in vital cohesion.

Prolonged and repeated attacks of chronic rheumatism chiefly affect and lead to deformity of the hip-joint, and generally all the large joints. It is most common after thirty years of age; and is especially frequent among the labouring poor, and among soldiers and sailors, who are exposed to the changes of season and weather—to cold and wet. The symptoms are always aggravated at night, and by vicissitudes of weather, especially the prevalence of east winds, humid and cold states of the atmosphere, and the disease is mostly associated with derangement of the digestive organs.

The joints of the hands are often also liable to be affected. Those of the fingers are generally most deformed, the joints being liable, in extreme cases, to dislocation.

The treatment of chronic rheumatism does not differ in its general details from that of acute rheumatism. Decoction of *cinchona*, preparations of *guaiacum*, with *alkalies* and *colchicum*, are the best remedies after the action of such searching evacuants as *calomel* and *jalap* have removed morbid accumulations, and improved intestinal secretions. The various forms of the so-called "*Chelsea Pensioner*," comprising *guaiacum* and *sulphur*, are of great service taken in the form of an electuary. *Iodide of potassium* is also of great benefit in the *arthritic* forms of chronic rheumatism, combined or not with preparations of *aconite* and *colchicum.* Warmth of flannel and the warmth of bed, with free perspiration, generally tend to mitigate and shorten the severity of the paroxysms. The *Turkish Bath* is also of great benefit—*if the heart is sound.*

ACUTE GOUT.

Natural History.—This is a specific febrile disorder, characterised by nonsuppurative inflammation, with considerable redness of certain joints, —chiefly of the hands and feet, and, especially in the first attack, of the great toe, and attended by excess of uric acid in the blood, and probably also of phosphoric acid. The constitutional affection tends to culminate in a paroxysm, or "fit of the gout," at longer or shorter intervals, when various joints, textures, or parts of the body are apt to become affected.

When gout has become fully developed, and has assumed its specific character, it produces all the forms of articular inflammation which have been described in rheumatism. These inflammations attack nearly the same parts, as the bones, cartilages, synovial membranes, bursæ, ligaments, muscles, tendons, and aponeuroses. These inflammations have little to distinguish them from rheumatism, except the singular pathological phenomenon of a tendency to the deposition of the urate of soda—a discovery we owe to the late Dr. Wollaston.

In cases of chronic gout, with chalky deposits round the joints, uric acid is always present in the blood, and deficient in the urine, as demonstrated by Dr. Garrod. It exists in the blood serum, and in the serum effused by blisters, as well as in the peritoneal and pericardial fluids.

The natural history of the disease shews—(1.) That there is a disposition or tendency in the morphological relations between the solids and fluids of the whole system to develop some specific constitutional poison, which betrays itself by certain constant effects at periodical intervals, although these may be irregular. (2.) That these local effects are prone to develop themselves in the joints of the extremities, or to express themselves by symptoms of a particular kind in the internal organs, and in various textures of the body.

The development of peculiar local affctions in connection with gout are also worthy of notice. For example, the occurrence of—(1.) "Fugitive pains," or twitches which suddenly attack persons of gouty habit—no doubt, due to congestion. Sometimes the congestion is more lasting, as in the lobes and cartilages of the ear, where concretions sometimes occur. (2.) A singular affection of the teeth, which consists in an insuperable desire to grind them, is noticed by Graves. (3.) The occurrence of *tic-douloureux* of the several branches of the fifth pair. (4.) Daily paroxysms of intense heat of the nose, which continue for three or four hours, the part becoming first of a bright and then of a purplish red colour, spreading over the upper portion of the cheek. (5.) The occurrence of *gouty sciatica*, in which the specific inflammation affects the trunk of the sciatic nerve, and which, extending by the neurilemma of the nerve, may in process of time extend to the spinal marrow and its investments, and give rise to derangements of the latter, terminating in ramollissement and structural degeneration. These affections are always greatest when the stomach is most deranged.

It is now generally believed that gout is hereditary; and in many instances it is so, whether the intemperate habits of ancestors are followed out, or whether the mode of living be abstemious. In some families it attacks only alternate generations, following what has been called "the law of *atavism*." One of the constant characters of a gouty conformation of the body is former or existing corpulence. The disposition to develop gout may also be brought about by abnormal habits of existence; and if the hereditary predisposition is present, the conditions for developing the latent diathesis are more easily made efficient. All are agreed as to the influence of full living, with the free and habitual use of wine; and, especially as to the influence of what may be called gross living—great and indiscriminate consumption of animal and vegetable food, with indulgence in beer and malt liquors generally. It appears that it is not so much the particular variety of alcoholic drink used, as the mode and extent of the use, which tends to develop the gouty state; but it is believed that of all wines in common use, those of the Rhine vintages are the least productive of gout. They are said to contain less alcohol than any of the Southern wines, and less than those of Portugal, Spain, Sicily, Cyprus, and Madeira. The influence of malt liquors is especially obvious in those examples of gout which occur in the lower classes who drink much beer and take little food. It is interesting to notice that in the non-beer-drinking countries the lower classes escape. Gout is rarely seen in Scotland.

Generally, it may be stated that—(1.) *Hereditary tendency* is the most important factor in causing gout in any individual case. It can be traced to this source in about one-half the cases. (2.) The supply of more nourishment (and especially of *nitrogenous* elements) than is used or required by the wants of the system, to replace what has been used up in the body, is another most important factor in the development of gout.

The varieties of gout, in addition to the acute form, are *chronic gout* and *gouty synovitis.*

The symptoms of gout vary according as the disease attacks the joints, the stomach, or the intestinal canal; but the proportionate frequency with which these different parts are attacked is not yet ascertained. When the viscera are affected, it has been termed *irregular*, *retrocedent*, or *misplaced gout.*

Sydenham thus describes an acute attack or fit. He was himself the patient.

"It comes on a sudden towards the close of January or beginning of February, giving scarce any sign of its approach, except that the patient has been afflicted for some weeks before with a bad digestion, crudities of the stomach, and much flatulency and heaviness, which gradually increase, till at length the fit begins. The patient goes to bed, and sleeps quietly till about two in the morning, when he is awakened by a pain, which usually seizes the great toe, but sometimes the heel, the calf of the leg, or the ankle. The pain resembles that of a dislocated bone, and is attended with a sensation as if water just warm were poured upon the member; and these symptoms are immediately succeeded by a chilliness, shivering, and slight fever. The chilliness and shivering abate in proportion as the pain increases, which is mild in the beginning, but gradually becomes more violent every hour, and comes to its height towards evening, adapting itself to the numerous bones of the tarsus and metatarsus, the ligaments of which it affects so as sometimes to resemble a tension or laceration of them, sometimes the gnawing of a dog, and sometimes a weight and coarctation or contraction of the membranes of the parts affected. The parts become so exquisitely painful that the patient cannot endure the weight of the clothes, nor the shaking of the room from a person walking quickly therein; and hence the night is not only passed in pain, but likewise with a restless removal of the part affected from one place to another, and a continual change of its posture. Pain does not abate till two or three in the morning—that is, till after twenty-four hours from the first approach of the fit. After the pain abates, the part affected is found to be swelled; whereas before only a remarkable swelling of the veins appeared, as is usual in all gouty fits.

"The next day, or perhaps two or three days afterwards, the part affected will be somewhat pained, and the pain increases towards the evening, and remits towards break of day; and what we call a fit of the gout is made up of a number of these smaller fits. At length the patient recovers, which may happen in fourteen days. In the aged, and in those who have frequent returns of the disease, recovery may take two months; but in such as are more debilitated, either with age or the long duration of the distemper, it does not go off till summer advances."

In aggravated cases it attacks both feet, the hands, wrists, elbows, knees, and other parts; sometimes bending the fingers crooked and motionless, and at length "forms stony concretions (urate of soda) in the ligaments, in which, destroying both the scarf skin and the skin of the joints, stones not unlike chalk of crabs' eyes come in sight, and may be picked out with a needle. Sometimes the morbific matter is thrown upon the elbows, and occasions a whitish swelling almost as big as an egg."

During the first fourteen days the urine is high-coloured, and after separation lets fall a kind of red gravelly sediment. Not above a third part of the fluids taken is voided by urine during the febrile paroxysm, the bowels also being generally constipated during this time. The fit is accompanied throughout with loss of appetite and chilliness of the whole body towards the evening.

When the fit is going off, a violent itching seizes the foot, especially between the toes, and the skin peels off.

The functions of digestion, and especially the hepatic and urinary secretion, are much deranged in all cases of gouty paroxysms. Besides loss of appetite, flatulence, heartburn, stomachache or colicky pains prevail, the tongue is loaded, the bowels are bound, and gas, with impacted fæces, distends the intestines, especially in the epigastric and umbilical regions. The hypochondriac regions, especially the right, are the seat of painful tension and uneasiness. The first alvine dejections are generally solid and dark-coloured, not unfrequently very fetid; and in some instances large quantities of dark-coloured excrement are brought away.

The urine, when scanty and of a deep red colour, is voided with pain and scalding along the urethra. The sediment consists of urate of soda, the phosphoric salts, and urea mixed in various proportions. When dyspeptic symptoms are associated with feebleness, a whitish magnesia-like powder, consisting chiefly of the phosphates, is deposited, or alternates with the other deposits.

Cases of chronic pain, with stiffness and swelling of various joints, are thus far similar to cases of chronic rheumatism; but when they are attended with deposits of lithate of soda, such cases are directed by the

College of Physicians to be returned as cases of "*chronic gout;*" and those in which there is marked distortion, as cases of "*chronic osteo-arthritis*"—a disease which may be defined as "*An affection characterised by pain, stiffness, and deformity of one or more of the joints, associated with deposition of new bone around them.*" The disease is also named "*chronic rheumatic arthritis,*" or "*arthritis deformans*" (see page 182).

Treatment resolves itself into—(1.) The selection and administration of those remedies which shall tend to subdue, control, or eradicate the latent disposition, constitutional tendency, or gouty diathesis, during the interval of comparative health. (2.) The adoption of such means as may be safely used to modify the severity of, or shorten, the paroxysms. The paroxysm must be interfered with cautiously. It is the means which nature takes to rid the constitution of the *materies morbi*, and which is undoubtedly relieved for a time, if the disease is allowed to run its course. But the removal of the paroxysm, or its subsidence, does not necessarily remove the constitutional diathesis. That must be modified by promoting the healthy and normal transformation of the tissues of the body as much as possible (see page 123, *ante*).

During the paroxysms, free evacuations of the intestines are called for by *compound jalap powder* and *calomel;* after which *colchicum* is the remedy which comes nearly to the character of a "specific." Ten to twenty minims of the wine are to be given every six or eight hours, combined with *bi-carbonate of potash*, very much diluted.

Opium, in the form of *Dover's powder*, should be given, if there is much pain; and small doses, repeated every three or four hours, contribute greatly to the comfort of the patient, when it procures a gentle diaphoresis, which is to be maintained by the use of hot air or vapour baths, and the use of warm diluents.

The affected parts ought to be wrapped up in flannel or cotton wool.

Warm anodyne lotions or fomentations may be used, and the part afterwards lightly covered or encased in flannel or fine wool, while the limb is at the same time kept elevated.

The "bootikins" of Horace Walpole, so strongly recommended and given away by him to all his gouty friends, seem to have been merely a fine bandage of *flannel*, applied moist and firmly over the limb, and then a roller of oiled silk over it, giving moist warmth like a poultice. Writing to Horace Mann, he says:—"You must put them on at night, and tie them as tight as you can bear—the flannel next to your flesh, the oilskin over. In the morning, before you rise, you must dry your feet with a hot napkin, and put on a pair of warm stockings freshly aired." Over the bootikins at night draw a pair of thread stockings

(*Life and Letters*, vol. vii., p. 224). A *warm* mixture of *tincture of camphor* with milk, applied by means of linen compresses, and frequently renewed, also gives local relief.

Tincture of aconite may be similarly applied (*f*℥iss. to *f*℥iv. of milk).

The hypodermic injection of a sixth, a fourth to a third of a grain of *muriate* or *bi-meconate of morphia*, in any convenient part of the body, often also relieves the local pain.

Blisters have been recommended, and are of most advantage in asthenic chronic cases, when the inflammation has a tendency to linger in the articulations, and to cause liquid effusion, or to affect the viscera. Blistering ought to be had recourse to immediately over a joint in all cases of non-articular, visceral, or retrocedent gout.

CHRONIC GOUT.

Natural History.—The nature of chronic gout does not differ from acute gout, except as regards its *chronicity.* This chronicity is shewn by the frequency of the attacks of gout, and by other persistent and permanent signs of the gouty constitution. The dyspepsia is especially persistent; and although distinct paroxysms are accompanied by less pain and fever than in acute gout, they last for weeks or months, and several joints are affected at once, or in rapid succession. The chalky deposits, described as a characteristic lesion, in and about the joints, are most common in cases of chronic gout. The swelling and redness of the part develop very slowly. The redness is generally less intense, and the swelling more diffuse and œdematous than in acute gout, and it does not subside with the desquamation of the cuticle. After repeated attacks, the volume of the part grows by new deposits, and may eventually attain a considerable size; and the continued irritation of these deposits causes pain, difficulty of motion, and great deformity of the parts implicated. Phlegmonous inflammation is common; abscesses sometimes occur about the joint, and the pus contains masses like soft mortar, from the breaking up of these chalky concretions.

Observations on body-temperature are wanting alike in gout and in chronic gout. The febrile phenomena may be characteristic. Chronic gout may persist at intervals for fifty years; and in some cases the paroxysms become so frequent and irregular, as rarely to be ever absent, and only a month or two in summer may elapse between the attacks.

A fit of chronic or "*inveterate gout*" commences, as Sydenham observes, especially in the morning, when the ligaments of the bones of the metatarsus are violently stretched, and seem to be squeezed with great force, as if with a strong hand, generally after yawning. And sometimes, though no yawning has preceded, when the patient has disposed himself to sleep, he feels a blow on a sudden, as if the metatarsus were being broken in pieces by a large stick, so that he wakes crying out with pain. The tendons of the muscles of the tibiæ are sometimes seized with so sharp and violent a convulsion or cramp, that if the pain it occasions were to last only a short time it could not be borne with patience.

The succeeding paroxysms, after many racking pains, become less painful, when, "instead of the usual external pain, a certain sickness, a pain in the belly, a spontaneous lassitude, and sometimes a tendency to diarrhœa succeed."

Another form of chronic gout is known as *atonic gout*, when the joints enlarge, and the tissues and ligaments become thickened and the seat of various effusion, so as often to distend and even to dislocate the bones; and yet, if the patient be kept quiet, he experiences no pain. The patient suffers from loss of appetite, indigestion, sickness, nausea, flatulence, acid eructations, pains of the stomach, cramps in the legs, and in various parts of the body; also great dejection of spirits, vertigo, palpitation, fainting, asthma, and also, perhaps, from stone or gravel. The most insignificant causes, such as errors of diet, excitement, exposure to cold, changes of weather, and the like, will bring about these general constitutional symptoms, accompanied sometimes with pains in one or more joints, resembling commencing attacks of gout.

In the course of this disease there may be a metastasis to the stomach or other part, and the affection is then termed "*retrocedent gout*," the pain in the joints being trifling, or having entirely subsided. The term is "*applied to cases of gout in which some internal organ becomes affected on the disappearance of the disease from the joints, and is referable either to acute or chronic gout.*" The organs most frequently affected are the *stomach*, *intestines*, *brain*, and *heart*, when the symptoms may be either of a spasmodic or inflammatory character. The spasmodic is the most frequent.

Gout affecting the encephalon may sometimes present the phenomena of an apoplectic seizure, or be indicated by severe circumscribed headache, giddiness, and vomiting.

Gout affecting the heart may induce irregular and feeble action of that organ, associated with disturbed circulation, dyspnœa, and fainting.

Gout affecting the spinal canal may induce sudden paraplegia.

It is only when gout runs its course with unusual symptoms, when the patient suffering from gouty inflammation of the joints suddenly is attacked in some of these inward parts, especially when the gouty affection of the joint is subsiding or developing, or terminating by copious excretions of urates by the kidneys, that we are warranted in considering such attacks as "retrocedent gout."

Besides being thus a migratory disease from part to part, gout often alternates with other chronic diseases, such as *asthma* and *rheumatism*, and may co-exist with them.

Treatment.—In chronic gout the treatment is the same as in acute gout; but as, next to hereditary predisposition, a disproportion between the amount of food and drink taken and the necessity for it is a great cause of the disease, means ought to be taken to regulate the diet and promote metamorphosis of tissue during intervals of freedom from gouty paroxysms. The habits of the patient ought to be regulated by written rules for him to abide by, if he would be free from gout. The form, the quantity, and the quality of the food ought to be precisely prescribed. Vegetables, with soups and meat, must be allowed only once a day—not oftener. Beer, wine, and alcoholic fluids generally, as they retard the metamorphosis of tissue, are injurious, and must be forbidden to gouty patients. The same is true of tea and coffee. Water, pure water only, taken in quantities as large as possible, promotes the metamorphosis of tissue to a greater extent than any remedies we know of. Its use does not lessen appetite for food—as is the case with beer, wine, spirits, tea, and coffee. It promotes the flow of fluid by the kidneys, and increases the excretion of *urea*. Combined with muscular exercise, the use of pure water hastens, to the greatest possible extent, the transformation of tissue; and, combined with the use of certain mineral waters and baths, "a connecting link," as Niemeyer writes, is established between the dietetic and medicinal treatment of gout.

The mineral springs which exercise the most favourable influence on the gouty constitution are those of Aix in Savoy, Bath, and Buxton, Ems, Gastien, Homburg, Karlsbad, Kissengen, Marienbad, Neuenahr, Pfäffers, Pyrmont, Schwalbach, and Spa, Toplitz, Wiesbaden, Wildbad, and Vichy. The particular mineral water must be selected according to the nature of the individual case: for the robust and those of full habit, the alkaline saline springs should be chosen; when torpidity of the bowels predominates, the purgative waters should be used; when the skin is inactive, the sulphur springs may be used; and when much debility prevails, or an atonic state exists, then the more simple thermal springs may be prescribed. The beneficial influence of these natural mineral waters is especially perceptible in the reduction of plethora, and in the regulation of the functions of the bowels and skin. Their use should be prohibited when there is much structural disease in any important organ, especially in the heart or kidneys; and even when organic mischief is slight, the greatest caution in their use is necessary. They are to be avoided when an acute attack is either present or threatening.

GOUTY SYNOVITIS.

Natural History.—In chronic forms of gout the local affection of a joint may predominate over the constitutional disease, and when repeated attacks of gout affect a joint, during the course of which the inflammation is invariably accompanied by the deposition of the salts peculiar to gout, the joint at last loses its capacity for movement. Such is gouty synovitis. In place of the normal products of inflammation in the synovial structures of a healthy subject, the synovial fluid is thickened by the chalky-like material, and the synovial membrane is studded with the small white masses of urate of soda. The synovial membrane becomes thickened and vascular; the ligaments and areolar tissue become condensed, and serious lesion of the joint is apt to be the final result. It is permanently injured, either by becoming so rigid that its functions are practically destroyed, or from the formation of the chalk concretions or *tophi*, which destroy the joint-structures. It is the existence of these chalky deposits—the special characteristic of the gouty affection—which distinguishes *gouty synovitis* from the *chronic osteo-arthritis* about to be described.

Treatment.—The principles of management do not differ from those to be followed out in *chronic gout.* The diet must be carefully regulated, and the dyspepsia relieved. The secretions, urinary and intestinal, must be regulated.

CHRONIC OSTEO-ARTHRITIS—*Syn.*, CHRONIC RHEUMATIC ARTHRITIS.

Natural History.—By some this affection has been regarded as a form of *chronic articular rheumatism;* others regard it as essentially different; and although the College of Physicians have retained a synonym to indicate the connection of the disease with rheumatism, they have placed the affection after gout, and not after rheumatism. It seems also to have been one of the numerous affections comprehended under the name of *rheumatic gout*—a term which has been advantageously omitted in the nomenclature of the College of Physicians.

This disease is characterised by pain, stiffness, and deformity of one or more of the joints, associated with the deposition of new bone round them. It may attack any joint indiscriminately, when it becomes so swollen and misshapen that the term "*arthritis deformans*" has also been given to the disease. The articular inflammation generally commences with the synovial membrane. It not only affects the synovial capsule and ligaments, but the cartilages and ends of the bones become involved in lesions which are characteristic of the disease. The articular cartilages and surface of the bone eventually disappear, an induration of the central parts of the joint succeeds, followed by an extensive proliferation of new bone (*osteophytes*), which grows round the peripheral portion of the joint ends of the bones, giving them a very ragged appearance. The ends of the bones are in immediate contact by smooth articular surfaces, without any intervening cartilage.

The disease develops very slowly—most commonly between the twentieth and fortieth years of life; but it may begin late in life, and even in advanced age. Pain is increased on pressure and on movement of the joint; and if the hand be laid on the joint when it is moved, a crackling or crepitation may be felt, the joint being almost dry, or containing a very small amount of synovia. The disease generally begins in both hands, and passes to the feet, and great deformity takes place from subluxation of joints, enlargement of the epiphysal ends of the bones, and destruction of the articular cartilages. The fingers ultimately are flexed on the metacarpal bones, and drawn over *seriatim* to the ulnar side of the palm, so that the fingers lie over each other. These characteristic enlargements of the joints acquired for the disease originally the name of *nodosity* of the joints, affecting chiefly the hands and feet; and more recently this is the form and site of the disease to which the term *rheumatic gout* has been most commonly applied. When the larger joints were implicated in a similar morbid process, the disease was then generally considered to be *chronic rheumatism;* and when seated in the hip-joint, as is usually the case in old people, the disease was described under the name of "*morbus coxæ senilis.*" Now the name placed at the head of this subject is the official name, which is meant to comprehend all these forms of the disease.

It sometimes succeeds chronic rheumatism, when, as a rule, many joints are affected, and the disease is no doubt influenced by the constitutional diathesis of rheumatism; and as there is a great resemblance to rheumatism in this disease, details of differences are to be found in the table on the following page.

Treatment.—*Chronic osteo-arthritis* must not be treated either as gout or as rheumatism. *Colchicum* is generally injurious, and so also is alkaline treatment. The action of the skin is to be encouraged by hot-air baths, the frequent use of the Turkish bath, and by *Dover's powders* at

Table II.—The Differential Diagnosis of Gout, Rheumatism, and Chronic Osteo-arthritis (Dr. Garrod).

Gout.	Rheumatism.	Chronic Osteo-arthritis.
Strongly hereditary.	Less so than gout.	Less so than gout, if at all.
Much more frequent in males and the better classes.	As frequent in females.	More frequent in females, and among poor and ill-fed.
Seldom occurs before puberty, generally much later—30 to 35.	More frequent in the young, and before middle age—16 to 20.	Occurs both in young and old—usually 30 to 40.
Induced by high living, overfeeding, wine and malt liquors, preceded by indigestion.	Occurs in the weak, and not caused by wine, &c.; excited by cold and damp.	Often induced by depressing causes, and sometimes excited by cold. Preceded by exhaustion and debility.
The smaller joints particularly affected in early attacks, and especially great toe.	Large joints more affected than small, usually several in number.	Large and small joints about equally affected.
Local symptoms intense, shining surface and enlarged veins. Permanent enlargement after a time, with deformity and deposit of urates.	Symptoms less severe than gout. No enlarged veins, no desquamation.	Symptoms not severe, but long-continued; deformity, without deposit of urates.
Great pain, œdema, and desquamation of cuticle.	Pain less intense; seldom œdema.	Less pain, much swelling, and often some œdema.
Does not induce acute inflammation of the structures of the heart, but nervous depression of heart's action, may also affect stomach, brain, or kidneys.	Often causes acute pericarditis and endocarditis, and sometimes pneumonia.	No tendency to cause heart disease.
Febrile disturbance moderate.	Febrile disturbance great; more than from local inflammation.	Little febrile disturbance, but gradually progresses in severity.
Paroxysms periodic in early attacks.	Attacks not periodic.	No periodicity.
Early attack lasting but a week or ten days.	Attacks generally much longer.	Duration of attacks indefinite.
Blood rich in uric acid.	No uric acid in blood.	No uric acid in blood.
Constant deposit of urate of soda in inflamed cartilages and ligaments and external ear.	No deposit of urate of soda.	No deposit of urate of soda; ulceration of cartilages of joints.
Often leads to kidney disease.	No tendency to cause kidney disease.	No tendency to induce kidney disease.
Often produces chalk-stones externally.	Never causes chalk-stones.	No chalk-stones produced, but swelling of joints.

bedtime. Warm bathing gives relief, and the mineral springs of high temperature, warm clothing, and residence in a warm climate during winter months, contribute greatly to comfort. The diet must be nutritious and easily digested, and some form of alcoholic stimulant is generally required. By way of medicine, the *guaiacum electuary* is most beneficial in regulating the bowels; while *iron*, *quinine*, and *cod liver oil* are required as tonics.

SYPHILIS.

Natural History.—A disease which is the result of a specific poison, produced solely by contagion or implantation on some part of the body, generally through an abrasion or sore consequent on sexual intercourse with an infected person. Three weeks or a month after absorption of the poison a peculiar series of phenomena supervene, which mark the general infection of the system. The principal anatomical signs of general infection consist of induration (specific) round the spot where the virus has been implanted, induration of the lymphatic system of glands, the formation of nodes or gummatous nodular tumors in the connective tissue generally, and especially in that of the true skin, bones, mucous membranes, and solid visceral organs—*e. g.*, liver, brain, lungs, and heart. A cachectic condition of the system follows, and accompanies the phenomena of infection; and indurations may remain in the form of hardened fibrous tissue in various parts of the body for an indefinite period of time.

The poison of syphilis undergoes a process of multiple elaboration or development in the system before its full effects are completed; and the lesions it induces demonstrate some of the most interesting points in the pathology of the multiplication or reproduction of morbid poisons. It is this multiplication which ultimately destroys life, through a degeneration of the tissues and the establishment of a cachexia, or by the induction of grave lesions in important visceral parts, such as the brain, the lungs, the liver, or the kidney.

The earliest effects of the syphilitic poison upon the system, after the period of incubation has passed, become established during the occurrence of a "*hardening process*" or induration of the tissue which ultimately surrounds an infecting venereal sore—the local papule and its subsequent ulcer or sore. This hardening process is peculiar; and although not constant as to the local sore, it is constant as regards the glands or lymphatics, which proceed from the vicinity of the part inoculated. It occurs in one or other of the three following conditions:—(1.) Hardening or induration of *sore* and *glands*; (2.) Hardening and induration of the *cicatrix* and *glands*; (3.) Hardening and induration of *lymphatic glands* only—the original local lesion never having become hard. The induration is best developed in the skin, and less so in the mucous membranes. It may continue, and generally continues, from *three* to *nine* months. The induration always presents the same anatomical composition. It resembles the development of fibro-plastic tissue in the substance of the true skin (dermis). It is an exuberance of growth (a proliferation) of the elements of tissue; and similar to the gummy tumors or nodes that afterwards appear in the solid viscera, such as in the liver and testicles. From these specific and characteristic local conditions, as from a focus, the system eventually becomes contaminated. The steps or sequence of phenomena associated with this contamination are not yet clearly understood; but as the contamination is expressed by very constant and specific characters, it is obvious that the original virus has become *intensified* in its action (as is also the case with the virus of hydrophobia), its pernicious influence more active and obvious, while its specific secondary and tertiary effects become more fully and extensively developed. Some of these secondary lesions of syphilis are even now known to be inoculable.

There are several independent affections to which the common name "Venereal" has been applied, each capable of transmission from person to person within certain definite periods. The following are the venereal affections which are specifically distinct, and for each of which a separate specific poison exists:—(*a.*) Gonorrhœa; (*b.*) "Simple" "non-infecting" chancres, ulcers, or sores; (*c.*) "Infecting" chancres, papules, ulcers, or sores; (*d.*) Mixed chancres—the combined result of the virus of (*b.*) and (*c.*); (*e.*) Subsequent lesions retaining specific powers of contagion (some local forms of secondary syphilitic lesions).

In addition to the specific virus of gonorrhœa (which may be eliminated as distinct from those about to be noticed), two forms of venereal disease, distinct *in their origin*, *propagation*, *and development*, are to be recognised. An "infecting" and "non-infecting" sore are to be distinguished. The sore which eventually *contaminates* the system commences differently from the sore which does not infect the system. The "infecting" sore (the one which contaminates) commences as a dry papule, pimple, abrasion, fissure, or crack, around which, after a period of incubation of three or four weeks—average twenty-four days—a specific growth takes place—a *sclerosis* or *induration*—forming a lump or protuberance more or less voluminous. A pustule is no essential part of the process, nor is suppuration. They are accidental phenomena, the result of irritation, pressure, or laceration, which produces a sore or ulceration—a result always very easily established and maintained in connection with infecting sores, as compared with other sores. There is then established an *erosion*, as a second form of primary lesion often seen; and lastly, the indurated chancre (syphilis), as the third form of primary lesion. *The dry papule* is the rarest form seen by the surgeon; for usually that stage has passed before advice is sought. It is a papular protuberance, varying in size from a pin's head to that of a sixpence, at the point of contamination, of a dark-brown red or purplish colour, round or oval, firm and elastic, sometimes covered with white scales of epithelium or scurf—hence sometimes called a *desquamating papule*.

The induration and the papule sometimes both disappear by resolution or absorption, without ulceration, just as the gummy tumors or nodes disappear in the same way. The induration loses its resistance and elasticity, diminishes in extent and volume, becomes gelatinous, finally subsides, and leaves behind a slight violet, coppery, or black depression. These are the most insidious cases; and when secondary phenomena appear, the existence of a primary sore is generally denied, as never having been considered of sufficient importance to attract attention. It may, in fact, never have been seen or noticed in any way.

The syphilitic or hard chancre erosion is the most frequent form in which primary syphilis presents itself. *Patchy excoriation*, or *superficial ulcer* of primary syphilis, or *parchment-like chancre* (Ricord's *chancre parcheminé*) are other names by which this form has been described. It commences as a copper-red spot, scarcely raised, papular, and dry. It is covered with a crust or thin scales, which desquamate, and finally the spot becomes eroded or slightly ulcerated on the surface. The ulceration is circumscribed within the induration, and presents a *flat* rose-coloured surface, projecting on a level with the summit of the swollen part; and is prominent in proportion to the amount of increased volume and induration. If it is pinched up between the finger and thumb, it imparts a feeling as if a bit of parchment had been inserted beneath the surface of the ulcer.

It discharges a small quantity of serous fluid from a diffused base, which is indurated on its surface, rather than deeply. This sore is often so slight, the discharge so little abundant, cicatrisation so rapid, that, in the absence of induration of the sore, prognosis must be doubtful, till some secondary result demonstrates contamination of the system.

This lesion lasts about two months, terminates by resolution and cicatrisation, and generally leaves a slight induration, with the corresponding ganglia hard and indolent.

With the *indurated sore of syphilis—non-suppurating chancre—Hunterian chancre* (*ulcus vallatum*)—induration is the primary lesion, first as a papule, over which a crust may form, and underneath this crust a cup-shaped ulcer of greater or less depth rapidly develops itself. It is indolent in its progress, and having the appearance of being scooped out, it presents raised and rounded edges, a glossy irridescent surface, a base generally greyish or lardaceous-like, bathed with a serous or watery-like secretion, not re-inoculable, and not pus. This is the most characteristic lesion of commencing syphilis. The induration, which forms the bed of the lesion and base of the ulcer, extends beyond its circumference, and has been compared to the half of a dried pea for hardness. It is elastic, resistent, and cartilage-like, quite different from cicatricial hardness or œdema. This condition of ulcer lasts about three to six weeks, when the edges of the chancre begin to empty themselves and collapse. The granular particles which covered its base become eliminated or absorbed. At any rate, the false membrane-like surface disappears, granulations form, and cicatrisation commences from circumference to centre. The resulting cicatrix is round and slightly depressed, and is the seat of induration, sometimes persistent. For a long time it is of a dark-brown or bronze colour, and finally all colour disappears, and an unnatural whiteness takes its place.

Soft chancre develops itself in a short time, generally at the end of two or three days. Within the first twenty-four hours, the point of inoculation becomes red, and, surrounded by a small circle of inflammation, tumefaction supervenes, a vesicular pustule appears, and finally a pustule-like ecthyma. To this succeeds an ulcer, more or less deep, round in shape, with a tendency to spread, edges cleanly cut, and sometimes everted. A magnifying glass shews small indentations on the edges, each surrounded by a red inflamed circle. The floor of the ulcer is uneven, covered with a yellow grey matter, which is a dirty thick pus, virulent and contagious in the highest degree. The base is as supple as the neighbouring tissue. This chancre is always inoculable on the same individual; and if the chancre is at first single, it may multiply to any extent. The glands are not affected; and if affected, usually only a single gland is painful from the first, and tends to suppuration.

A definite period of incubation exists for the "infecting" *syphilitic sore*, fixed by experiment upon persons free from the disease, and who never have had *syphilis*, as well as by casual observation. From the eighteenth to the thirty-fifth day (counting from the time at which inoculation was performed), the first symptom indicative of the general infection appears; and a mean of twenty-four to twenty-seven days may be considered as the usual period of incubation. The most common periods have been twenty-five and twenty-eight days—the extremes ten and forty-six days. Sometimes it may be longer, but it is never beyond six weeks or forty-two days. Longer periods are quite exceptional, and must be regarded as doubtful.

The "infecting" sore of *syphilis* does not remain merely a local disease. It contaminates the system, giving rise, by a multiplication like that of *small-pox* poison, to one of the most malignant, most lasting, and most destructive forms of a disease-poison that affects the human frame. The only constant index of such contamination or secondary disease commencing, seems to be the occurrence of multiple enlargement of related lymphatics and lymphatic glands, which begins about ten or twelve days after the indurated papule has made its appearance; or from four, five, or six weeks after *contagion*, *implantation*, or *inoculation* by sexual intercourse, or otherwise. Such glands do not suppurate. They are merely congested, and become hypertrophied. They enlarge slowly, and without pain, in the immediate vicinity of the sore; and can be felt as a group of enlarged glands beneath the skin. Eventually those in the axilla become similarly affected, and ultimately enlargement of the chain of glands, extending up towards the occiput, behind the sterno-mastoid muscle, is apparent.

A general morbid condition of the whole system is the necessary result of this extensive disease of the lymphatic glands.

The Fever of Syphilis is also characteristic; and during the early period, the differential diagnosis amongst febrile phenomena lies between "*intermittent fever*, *rheumatic fever*, *typhoid fever*, *gastric derangement*, and the *cephalalgia of Bright's disease*." The severity of the general symptoms are thus apt to divert attention from the investigation of the original and primary syphilitic lesion, even if it were known to exist. It is ushered in by symptoms like those which precede eruptive fevers. It usually precedes, by eight or ten days, an early secondary eruption; but the fever continues after the eruption appears, and is attended by general derangement of the functions, nausea, flying pains, frontal headache, and depression of spirits. The bodily temperature rises to 100° or 102° Fahr. at night, falling in the morning to 98° or 99° Fahr. This alternation may continue for days or even weeks, so long as fresh cutaneous eruptions continue.

If the sore of syphilis goes without treatment (as many do) it may be predicted that, within three months, there will occur the following category of symptoms:—

First,—General lassitude, headache, fleeting pains in various parts of the body, resembling rheumatism, evidently seated in the periosteum, chiefly the cranium and joints; alopecia, eruption of blotches or papulæ upon the skin; pustules upon the hairy scalp; engorgement of post-cervical ganglia; white patches on mucous membrane of mouth, anus, or vulva, occur, which may ulcerate.

After this, the order of evolution is not so constant and uniform in every case. Certain symptoms absent in one case may be present in another; but the cases of tertiary lesions may be arranged into two classes:—

1*st. Class.* Those in which the lesions follow immediately, as to time, upon the earliest general symptoms, and are identical in character with them.

2*nd. Class.* Those which occur after a considerable interval of time.

It is therefore natural for syphilis to shew itself, not in a continuous, but rather in an interrupted, succession of phenomena; and the reappearance of many syphilitic lesions (such as the lesion of skin and mucous membranes)—*erythema*, *alopecia*—differing in the early and late periods. In the early period, one of the earliest general symptoms is shedding of hair, which may grow again, because the hair bulbs are not seriously damaged; in the late periods, the bulbs are damaged, and the scalp becomes permanently bald. So also two forms of *iritis* and *icthyma* are distinguishable.

These are not to be regarded as relapses of the disease, but as phenomena in the natural course of its development.

A sore after a few weeks may heal up, but leaves a "lump"—that "lump" is specific induration, and denotes contamination of the system. The original sore is very often overlooked or forgotten, never having been seen or observed in any way. Hence its existence, if surmised, should always be *looked for*.

Induration of Glands, with induration of the original sore, is pathognomonic of syphilis. The induration of glands is constant. It commences usually during the first week of the existence of the ulcer; always within the third or fourth, and from ten to twenty days after induration of the sore.

The enlarged ganglia may point to the original site of chancre. Thus, the inguinal ganglia, enlarged and indurated, point to the genital organs, urethra, or hypogastric region; the group of glands near anterior and superior spine of the ilium point to the anal region; the sub-maxillary group to the lip, mouth, tongue; the axillary group to the elbow, hand, arm, or fingers, as the original sites of the sore.

The first general eruption of the skin takes place about ten weeks after contagion, or about seven weeks after commencing induration of the original sore, and between five or six weeks after enlargement of the lymphatic glands. The eruptions are *papular*, *pustular*, or *scaly*—the papular being the commonest, and the type or basis of all syphilitic eruptions. But they are often also associated together; and they are peculiar in their symmetry of distribution and in the curvilinear character of their grouping. They leave behind them stains of colour, pale cicatrices, or persistent ulcerations of the true skin. The local distribution of the syphilitic eruptions are also peculiar. Their seats of election in the order of frequency are,—(1.) The parts round the alæ of the nose and the angles of the mouth; (2.) The roots of the hair at the forehead and back of the neck; (3.) The inner angle of the eyes; (4.) The centre of the breast; (5.) The inner side of the limbs, the neighbourhood of the axilla, and the groins.

Secondary lesions and local growths in the internal viscera are now so uniformly found associated with a history of syphilis, that they are rightly regarded as the remote effects of the specific venereal or syphilitic virus. The anatomical form which these lesions assume at the commencement bears a stamp altogether peculiar, forming tumors which are named *gummata*, and which are the basis of the characteristic lesions of syphilis. They form growths which are composed of a well-defined tissue, but with elements extremely minute, which take origin from the elements of connective tissue, or the analogues of such tissue, and hence the universality of the site of these lesions. They are like pus or an abscess in this respect. Such *gummata* have now been seen in the testicles, the heart, the liver, the brain, the lungs, and the tongue.

Treatment.—As in the case of other specific diseases that are implanted by inoculation, the effect of the virus begins at once at the point of inoculation, and may not be destroyed as to its contaminating powers by any agency we know of. Experience shews that we must not conclude that, even by an early destruction of the sore, the occurrence of constitutional infection will be prevented; and the application of caustics to abraded surfaces after their exposure to contagion is useless to prevent infection. The poison is absorbed in a very short time—within a few hours. The exact nature of a sore cannot yet be recognised at a sufficiently early date (apart from all other means of diagnosis) as to whether it will or will not prove a sore carrying a virus which will affect the system. In cases where the sore is a suppurating one, *occurring soon* *after* exposure to infection, such a sore may be of a mixed nature, and therefore is of doubtful character, and always suspicious: for induration may set in later, at the usual period, shewing its syphilitic character.

The *local* progress of such sores may be arrested with escharotics, if they are applied at an early period of its existence, and before contamination of the system is evinced by induration of the base of the sore. Ricord and Sigmund have found that sores destroyed by the more powerful caustics, within *from three to five days*, have not been followed by syphilitic symptoms. But these may have been cases of soft chancre, which would not infect. The only efficient caustics for this purpose are —(1.) The *strong nitrate acid;* or (2.) The *potassa cum calce* (most conveniently used in the form of small sticks). *Nitrate of silver* is useless, from its limited action and deficiency of penetration. If the sore threatens to slough, the parts should be wiped dry, and *nitric acid* applied, and afterwards a lotion of the *potassio-tartrate of iron*, while the same drug is given internally. *Chloride of zinc paste* (FELL'S) is a useful escharotic to excite a healthy action round the periphery of a sore. If great pain attends the local progress of the chancre, a dose of *morphia* in *liquor ammonia acetatis* is highly beneficial.

The administration of *mercury* in syphilis has long been a subject of dispute; but there can be no doubt that the use of *mercury* is of permanent efficacy in the cure of syphilis in its *early stages*. It is then necessary to give it in a continuous and long course, and *to avoid doses likely to cause salivation;* beginning its use as soon as possible, continuing it long, and keeping the expression of its physiological influence as subdued as possible—the diet at the same time being liberal and nutritious. One to three grains of *grey powder* in the form of a pill (with or without *Dover's powder*), three times a day, is perhaps the most convenient form of administration. The local expressions of early syphilis should also be treated with mercury. Any sore, at the same time, should be dressed with black wash morning and evening, so long as any induration exists; and with its continuous use, induration ought to begin to yield in about a week. To the skin eruption an ointment of the *ammonio-chloride* is to be applied; and to the throat a gargle of black wash, or of the *bichloride* of mercury.

Iodide of potassium cannot take the place of *mercury* in the early stages of syphilis. It is useless in softening down indurations. It is of great value in arresting the destructive ulcerations of skin and mucous membrane in the later (tertiary) form of the disease, given in three to five grain doses combined with *carbonate of ammonia*.

CANCER—*Syn.*, MALIGNANT DISEASE.

Natural History.—A deposit or growth that tends to spread indefinitely into the surrounding structures and in the course of the lymphatics of the part affected; and also to reproduce itself in remote parts of the body. It is inferred, from various considerations, that a peculiar morbid material is separated from the blood, as in other constitutional diseases, and is constantly being renewed in the formation of cancers. There are no germs in the blood previous to the development of a cancer-tumor which can be recognised as a cancer-structure. It is evident, however, that a specific state of the system exists in the constitutional ill health or taint associated with cancer,—(1.) Because all parts of the body are liable to be infiltrated with the peculiar and specific growths which constitute the "cancers or malignant tumors," and that without any direct communication with the spot where the first growth took place; (2.) Because the removal of the locally diseased part does not arrest the progress of the constitutional disease; (3.) Because the cancer-growths tend naturally towards destruction of life, not necessarily from their local position, but through a peculiar marasmus which their existence establishes, and which some think due to the demands which these new growths make upon the system for increase and nutrition. They tend also to destruction of tissue around them. A continual hectic febrile state is established, and increasing emaciation follows the intense bodily suffering and mental anxiety they induce. The countenance becomes pale and anxious, with a slight leaden hue, the features become pinched, and the lips and nostrils slightly livid. The pulse is frequent and the pains are severe. At length there is generally nausea with greatly impaired digestion, and a tickling cough frequently supervenes. Severe stitches strike through the local morbid parts, the pulse becomes rapid and faltering, the surface cadaverous, the breathing anxious, and death alone brings relief.

Cancerous disease is also prone to pass by inheritance, in a form peculiar to itself, from parent to offspring, and to occur (probably by inheritance of common properties) in many members of the same family and generation. Not less than *one in three*, in Sir James Paget's experience, can be reckoned of all patients with cancer in whose families the occurrence of cancer is well known.

The general disease is thus either inherent by birth, or otherwise inbred. Its presence and complete development are indicated by the occurrence of peculiar growths in different parts of the body, to which the names of *cancers* or *malignant growths* have been applied. (See "cancer tumors," p. 44, *ante*). The malignant character of cancers is indicated by one or more of the following clinical characters:—Constant progress of the growths, their continuing to return after extirpation, not only in the original seat, but in distant and internal parts of the body; destroying and causing absorption of the invaded textures; infiltrating the tissues to an indefinite extent; tending to soften and ulcerate, and to affect the glands to which the lymphatics lead from the seat of local lesion. The increase and nutrition of these growths produce a peculiar marasmus, which tends to terminate in death. The anatomical constitution of the new growths is heterologous.

There is abundant circumstantial evidence to shew that malignant tumors are of *constitutional* origin—that they are local manifestations of a *constitutional* disease—that there is something specific, probably elaborated from the blood, which accumulates in their elements of structure. This specific material which composes cancers is different from all the natural constituents of the body; different from all the materials formed in other processes of disease; and is associated in the malignant tumor with structural elements which must be regarded as specific and peculiar, both in form and in mode of life. The main grounds for this belief are—(1.) The evidences, not always absolutely demonstrable, of a pre-existing unhealthy state of the constitution; (2.) The prolonged duration of the constitutional state which precedes the local expression of the cancerous tumors—the long-continued elaboration, often extending through several generations—thus shewing sometimes a tendency to alternation in the inheritance of the inborn state of ill-health; (3.) The secondary pyrexia, which is the result of irritation or of elimination of a morbid material, the re-absorption of which may tend secondarily to affect the blood.

Women appear to be more liable to malignant disease than men, and the increase is chiefly due to cancers of the breast and uterus; while in man it is chiefly the skin, the bones, and the digestive organs which suffer.

The mortality from the disease goes on steadily increasing with each successive decade until the eightieth year. It is eminently a disease of degeneracy, the frequency of cases of which increases as years increase.

Age has also much influence in determining the forms of cancer and the part affected. Hard cancers are rarely observed till after forty, and from that period the liability increases with age. Its most usual seats are also those on which age and functional activity have left their marks upon the organs. Thus it seldom occurs in the mammæ, uterus, or the ovaries, till after the cessation of menstruation, nor in the organs of generation of the male till towards old age, nor in the different portions of the alimentary canal till after forty. All these parts are then going into states of degeneration.

Soft cancers are most common in the earlier periods of life ; but then also they are observed to involve textures whose functional activity has been ever active, such as the glandular parts—for example, the lymphatic and lachrymal glands.

The local exudations which constitute the tumors or cancers consist in general of two parts, namely,—(1.) The material peculiar to cancer, consisting of very varied forms of nuclei, nucleated cells, and juice, all of peculiar natures, distributed through an intercellular medium; (2.) Areolar tissue, which constitutes the stroma or skeleton part of the new growth. The first part is the essential and heterologous part of cancer. The relative quantity of these crude materials gives the most marked and obvious ground—that of consistence—on which cancers have been classified—namely, into *hard* and *soft* cancers; but the grounds of classification are by no means fixed. The nature of the substance also affords a ground of classification. When the fibrous stroma is predominant, the new growth is *hard*, and has received the name of *scirrhus*. When the cellular elements predominate, the new growths are *soft*, and have received the name of *encephaloid* or *medullary* tumors. Sometimes the supposed nature of the substance is a ground for classification,—*e. g.*, *meleceris*, *atheromata*, *steatomata*. Many of the names given to cancers are only stop-gaps, tending to retard inquiry,—*e. g.*, *colloid*, *alveolar*, and the like. The true nature, rather than form, ought to be the ground of classification.

The cancer-juice is a most important element of the new growth. To the naked eye it appears as a viscid, whitish, creamy, yellowish fluid, which may be squeezed or scraped in considerable abundance from the surface of a section.

It is from the performance of the vital functions by all these elements —the clinical properties of the tumors—that we draw our conclusions regarding the innocency or malignancy of the new growths in which they form a part, rather than from their anatomical forms. Malignant tumors are indicated by the clinical characters given at page 46, *ante*, under "tumors." If we find adjacent textures are being infiltrated, poisoning the lymphatic current which passes from them, inducing new growths of a like nature in the lymphatic glands through which these currents pass, affecting the general system with a peculiar cachexia, marked by languor, debility, emaciation, and a peculiar sallow, leaden-like colour of the skin; and if after removal such growths return, then there is no doubt that the constitutional taint of cancer is made manifest by such local lesions. These present so many elements in common, that all these new growths are but manifestations of one disease, which has been named "cancer," and attributable to the constitutional ill-health already described. The varieties of this disease also run into one another by characters which are so insensible that definite lines cannot be drawn between them, and thus many species of cancers are described under various synonyms, as shewn in the following nomenclature:—

I.	II.	III.	IV.
Walshe and Bennett (1846-49).	Paget (1853).	Rokitansky (1855).	College of Physicians (1869).
Scirrhus, or hard cancer.	Scirrhus, or hard cancer.	1. Fibrous carcinoma.	(*a*.) Scirrhus.
Encephaloma, or soft cancer.	Medullary, or soft cancer.	2. Medullary.	(*b*.) Medullary cancer.
Colloid, or jelly-like cancer.	Epithelial.	(*a*.) Villous cancer.	(*c*.) Epithelial cancer.
All other forms of cancerous new growths are described by Bennett under the name of *cancroid* growths.	Colloid.	(*b*.) Cancer melanodes.	(*d*.) Melanotic cancer.
	Osteoid.	3 Epithelial cancer.	(*e*.) Osteoid cancer.
	Melanotic.	4. Gelatinous cancer.	
	Villous.	5. Carcinoma fasciculatum.	
	Hæmatoid.	6. Cystic carcinoma.	

Of these particular kinds of cancer some tend to affect certain organs rather than others,—for instance, *colloid tumor*, or so-called *alveolar cancer* is more frequently found in the stomach or intestines; *epithelial cancer*, in the skin and mucous membranes.

The *primary cancer-growth* commences in the textures of some organs rather than others—for instance, in the uterus and female breasts, in the stomach, the colon, the liver, the bones, and the brain. *Secondary cancers*, on the other hand, are most frequently developed in the lungs, the spleen, the salivary and lymphatic glands, in the small intestines, and in the serous membranes. But the local aptitude for cancer-growths is a subject unknown. We have no knowledge why one part rather than another should be the seat of cancer; but certain organs seem more liable than others at certain periods of life. For example, before thirty years of age the eye and the orbit are the parts first most liable to be affected, next the bones, testicles, and areolar tissue of limbs and trunk. Between thirty and fifty years of age the penis, uterus, external sexual parts, and breasts. After fifty years of age the integuments and digestive organs are more apt to suffer.

I. SCIRRHUS, or HARD CANCER, has two stages—a hard stage and a stage of softening. It is a "cancer characterised by hardness of the primary tumor, and by a tendency to draw to itself the neighbouring soft structures. It tends to ulcerate, the sore is commonly deep, uneven, and bounded by a thick everted edge."

The local hard or scirrhous state constitutes the first stage. It may grow in *masses*, or may be *infiltrated* into the tissues of the organ or part affected—the latter being by far the most common form. When in masses, they are generally lobulated, dense, and often contained in a cyst. These masses consist of two substances—one is the cancerous growth, and the other is areolar tissue; so that the appearance of the divided surface in general is that of a hard, white, semi-cartilaginous substance, streaked by fibres radiating from what appears to be the centres of connection to the circumference. They are of considerable density and firmness, and in hardness of texture vary from hard-boiled white of egg to cartilage—the knife making a grating noise as it cuts through them. The specific weight of these tumors is extremely great; and although in those parts which are external and more or less pendulous, as in the mammæ, this fact is by some distinguished surgeons an element in diagnosis, our exact information relative to the specific gravity of cancerous growths is still very limited—1·040 to 1·160 is the very wide range which I have observed such tumors to indicate. The cancerous growth, however, is much more frequently infiltrated among the areolar tissue of the different organs or tissues it affects.

The minute elementary structures of scirrhous are chiefly two:—(1.) Certain cells and corpuscles; (2.) a nearly homogeneous intercellular substance, in which they lie imbedded. As to the cells, multiformity of shape is their chief malignant characteristic.

After a certain but indefinite period, which varies from a few months to a few years, the scirrhous stage of *hard cancer* terminates, and the second stage, or that of *softening*, begins. In mucous membranes this softening usually takes place at the *surface*, or superficially,—as at the mucous surface of the neck of the uterus, or at the mucous surface of the stomach. An ulcer is the consequence of this softened state, and is at first superficial, presenting many remarkable varieties, such as an inverted or everted edge, and an irregular form, while its base may be granulating at one part and sloughing at another. Its course is burrowing, often penetrating between the cancerous lobules, and ultimately may perforate the limiting serous covering, such as the peritoneum. The pus secreted by this sore is fetid; often a mere ichor, or pus mixed with blood, and so acrid as to inflame the parts over which it flows. In a few instances the large vessels participating in the disease ulcerate, and the patient dies of hæmorrhage.

The duration of the scirrhous or hard stage of a cancerous tumor is very uncertain, and may terminate in a few months, or may last several years. A cancerous mammary gland, for instance, has been known to remain indolent for fourteen years, and has at the end of that time been removed by an operation. This indolent character of cancer is limited, however, to the hard stage; for, after it has commenced to soften, its course is rapid, and a few weeks or a few months generally terminate the patient's life, the part affected in no instance cicatrising, or being again restored to a healthy condition.

(2.) Medullary Cancer, or Soft Cancer, affects more especially the solid visceral organs. It is a "cancer characterised by a smoothly lobed surface, soft, irregular consistence, great vascularity, and usually rapid growth and reproduction. When ulcerated, it protrudes in large masses, which bleed copiously." Its cell-products are most profuse, and its course much shorter than hard cancers, the disease generally terminating in a few months. While hard cancer for the most part affects persons in the decline of life, soft cancer is most common in its earlier period, or adult age, from twenty-five to forty.

Although generally found in masses, it may be infiltrated; the former is the more common form, the latter the more rare. In whichever form it grows, however, it has two stages—namely, one of induration and one of softening. If we examine a soft cancer-tumor in the first stage, we find it composed, as in hard cancer, of very delicate stroma tissue and a peculiar morbid growth. The areolar stroma is of various densities, often extremely fine, and then again of considerable consistency and tenacity, and in either case radiating through the tumor and dividing it into lobules. The morbid substance or growth is of many degrees of hardness, varying from lard to cartilage, but is generally softer than in hard cancer; it is of a bluish semi-transparent whiteness. The duration of this hard stage is from a few weeks to two, three, or four months, and only in a few instances does it exceed that latter period. "*Hard encephaloid* is a designation sometimes applied to medullary cancers of unusually firm consistence."

The first stage passed, the process of softening takes place. This is evident on cutting into the tumor, and passing the handle of the scalpel over the divided surface, a milky-white substance being expressed. As the disease proceeds, the parenchymatous substance of the new growth is changed into the consistence of soft cerebral matter, or of thickened pus; it is consequently opaque, and varies in colour from white to red, and even black. These variations of colour appear to be owing to the different quantities of blood or of melanic matter which are effused, and with which the cancerous matter is commixed. When bloodless and white, the product is so peculiar that it has been termed *cerebriform*, and when mixed with blood, *medullary sarcoma*, *fungus hæmatodes*, and other terms, according to the different quantities of that fluid effused, which is often so abundant that the cyst or cavity at length contains little else than fibrin. "*Fungus hæmatodes*" is a term applied to some cases of medullary cancer which are more than usually vascular.

The process of softening commences indifferently in any part of the medullary tumor, at its centre, or towards its circumference; and if the tumor communicates externally, the quantity of softened matter discharged often amounts to many ounces in the course of the day. This profuseness of discharge appears to be owing to the great vascularity of the growth; for although in the hard stage only a few blood-vessels, with coats of great tenuity and delicacy, can be traced between the lobules, yet, in the softened state, a successful injection shews the growth to be made up almost entirely of blood-vessels.

The duration of the second stage is generally a few weeks, and very rarely extends to months. It appears, however, that anything which greatly irritates the part accelerates the process of softening. Thus, if a cancerous limb or tumor be amputated, the cancerous matter, primarily in a hardened state, appears to grow in new sites, subsequent to the operation, in a softened condition, no previous hard stage occurring.

There is scarcely any organ or tissue in which soft cancer has not been found; and by some pathologists the frequency of its occurrence in certain parts is believed to be in the following order:—liver, epiploica, mesentery, lymphatic glands, brain, nerves, spleen, testicles, uterus and ovaries, the eye, the bones, the heart, and lastly, the blood-vessels.

One of the most constant features of this disease, and which distinguishes it from hard cancer, is, that it often appears in many organs or tissues at the same time in the same patient. Thus, it has been met with in the coats of the bladder, in the liver, and in the lungs of the same individual. It has also a greater tendency to be reproduced after an operation for its extirpation than any other kind of cancer. This reproduction may take place either at the part operated on, or in some organ or tissue distant from the primary seat of the disease.

(3.) Epithelial Cancer, or Cancroid Epithelioma.—Of late years, under these names, or that of *cancroid*, pathologists have described a form of tumor which has all the vital and malignant qualities of cancer already described, but its minute elements consist of cells resembling those of epithelium or epidermis. It is therefore defined as "cancer characterised by its occurrence chiefly in parts naturally supplied with epithelium, and by the resemblance of its cells to those of the epithelium." It occurs almost solely on the skin or mucous membranes, being frequently seen on the lips or cheeks. It has been observed in the liver, in the lymphatic glands, and in acute hypertrophy of the mammæ. It only seems to occur where there is pavement or spheroidal epithelium. It has been seen on the serous layer of the arachnoid.

The principal sites are in the vicinity of the great orifices of the body; but the lips, and more particularly the upper lip, are most liable to the development of epithelial cancer. The cancer commences first as a small induration, afterwards a pustule or excoriation forms, and subsequently the deeper parts participate, and determine the form of the growth, which may be mulberry-shaped, villous, cauliflower-like, or nodulated. The surface is apt to become ulcerated at an early period, and an actual loss of substance takes place from the central parts. The resulting open sore has an irregular, grey, and often a bloody base; or it is covered with crusts, from below the edges of which a fetid and ichorous discharge may be caused to exude by pressure.

The tumor tends to infect secondarily the neighbouring lymphatic glands; and the fatal termination is generally by exhaustion or by putrid infection, when the progress of ulceration is not arrested.

The mean duration of cases of epithelial cancer is about six and a half years; and the duration seems to vary with the part as follows:—Nearly three and a half years for the lower lip, three and two-third years for the penis, nearly nine years for the neck and limbs, and nine and a half for the vulva and face.

It is continuous cell formation which accounts for the wide-spread destruction of parts induced by epitheliomata. The growth gradually presses on before it, and destroys whatever tissues it meets with. Great irritation is also given to the blood-vessels by the proliferation of the cells, and the pushings of them along between the separated papillæ, producing an interstitial effusion of plastic lymph. In this lymph the epithelial cells develop fresh nuclei and cells like themselves, and thus become a fresh centre of irritation, the disease advancing by fresh development of cells in the interstitial effusion.

The essentially characteristic anatomical elements of epithelial cancers are—(1.) Cells which bear a close resemblance to flat, pavemented, scaly, or tessellated epithelium; (2.) the insertion or infiltration of these into the proper structures of the skin or other textures. Partaking of these characters, the mass of new growth becomes so condensed by the pressure of rapid growth, often within limited space, that peculiar whorls of growing matter constitute the form seen on section of microscopic specimens.

(4.) MELANOTIC CANCER, or MELANOSIS, is a "*cancer* characterised by the *presence of pigment.*" It may be found distributed very generally in every organ and every structure of the same patient—often becoming first manifest in the soles of the feet or in the axillæ. The lymphatic glands subsequently become affected. Such growths are also found in the ovaries, in the mucous membrane of the bladder and intestines, in the kidneys, supra-renal capsules, heart and brain.

"*Fungus hæmatodes*" has generally been considered related to *melanotic cancer;* and the relationship is more than ever established in the connection which subsists between pigments and the changes which take place in extravasated blood. Frequent hæmorrhages are common in melanotic growths of a cancerous nature, due to extreme dilatation and thinning of the walls of the blood-vessels, and the red colour of such tumors must be referred to such kind of vascularity. Pigmentation of such tumors is therefore to be considered as of secondary formation; and in the majority of instances melanotic cancer consists of encephaloid or soft cancer, with the addition of black or brownish pigment. The pigment deposit, *per se*, is not necessarily malignant. The pigment of cancers is readily decomposed by nitric and other acids, while the *spurious melanosis* or *carbon* is not. The true melanic deposit exists with the soft cancer cells, either as an infiltration into them or in the form of isolated granules or small corpuscles. The pigmentation may be seen on microscopic sections to take place along the course of dilated blood-vessels. In an early stage the pigment is first contained in cells, whilst later it is found in free granular masses, through the dissolution and disappearance of the cells which contained it, and a gradual transition may, in general, be traced from the affected part into the normal structure of tissue, where it will ultimately become developed, and which is freely traversed by blood-vessels. Cells of various forms are to be seen in such tumors, which have first a yellow appearance and then a black, according to the amount of pigment deposited in them. The cell-walls subsequently disintegrate, leaving the pigment free.

The cells composing them—the greater part of the structures—are such as might belong to uncoloured medullary cancer, so that a small proportion of pigment seems to blacken the whole lump. The pigment is generally in granules or molecules.

(5.) OSTEOID CANCER is a "tumor usually commencing in the bones, consisting almost entirely of bone, and followed by similar growths in the glands and viscera."

(6.) VILLOUS CANCER is a name given to "cancer in mucous membrane, when covered by a villous growth."

Treatment.—No remedy has yet been found which can in any degree be considered curative of the constitutional state associated with cancer, and the efforts of the practitioner are consequently limited to relieving symptoms, and to the adoption of such palliative measures as may prolong life. It has generally been believed that to remove a cancerous growth where it is practicable must, on theoretical grounds merely, be attended with as much benefit to the constitutional disease as would attend the removal of a leg for acute rheumatism chiefly expressed in the knee-joint. The statistics of cancer shew, so far as they go, and as Dr. Walshe long ago shewed, that "excision of a cancerous tumor seems to awaken a dormant force. Cancers spring up in all directions, and enlarge with a power of vegetation almost incredible." Nevertheless, this rule may be too rigid. There are good reasons for removing cancers in some cases, especially mammary cancers and others accessible to the knife. The greatest measure of good may be done by making a careful selection of cases fit for operation, and rejecting all the rest as unsuited for operation.

COLLOID—*Syn.*, COLLOID CANCER, ALVEOLAR CANCER.

Natural History.—*Colloid*, *colloid cancer*, or *alveolar cancer*, is sometimes also called *gelatinous* or *gum-cancer*. In this form of disease the meshes of the new growth are filled up by a glue-like or gelatinous transparent substance, like half-dissolved gum-arabic. In the form of alveolar spaces, the fibroid tissue is extremely delicate and transparent, and the spaces are occupied by the glue-like matter in greater or less quantity. These growths are not now regarded (and their position in the nomenclature as a substantive disease would also indicate that they are not to be regarded) as cancers. They are limited growths, and not infiltrations; but they expand or grow to a very great extent.

LUPUS.

Natural History.—A spreading tuberculous inflammation of the skin, usually of the face, tending to destructive ulceration.

The disease is prone to extend itself quite irrespective of tissue; and in this respect *lupus* has been considered as allied to malignant disease; but its most evident affinities are with scrofula. It depends upon a *neoplasm*—upon a development of new growth in the tissue of the dermis, classed by Virchow among "*granulation growths*,"—the elements of which have been already described, under the head of *gummata*, in syphilis. But it is not here implied that *lupus* has necessarily any connection with syphilis. The nodules in *lupus*, which indicate its existence, are either isolated or they are diffused, causing considerable thickening of the skin: and the new growth advances from the superficial layers to the deeper parts, even to the cartilages and bones. Crusts of epidermis next form over the lesions, under which the new growth begins to soften and ulcerate. But sometimes the new growth subsides, the cell elements undergo fatty degeneration, followed by absorption—when a deep cicatricial-like loss of substance remains.

Two varieties of the disease have been distinguished by the College of Physicians, namely:—

(*a.*) *Chronic lupus.* (*b.*) *Lupus exedens*, defined as a variety "characterised by the rapidity, depth, and extent of the ulceration, and by appearing in rare cases on other parts than on the face."

The disease is rare before the tenth year of life, and still more rare after the fortieth; being most common between the ages of ten and twenty. It is less frequent among the rich than among the poorer classes.

The most frequent seat of *lupus* is upon the face, especially the nose; but in the *exedens* variety it may attack other regions, such as the *neck*, *shoulders*, *chest*, and *extremities*, especially over the joints.

Treatment.—The new formation must be removed or destroyed; but opinions differ so much as to how this is best effected, that the reader is referred to the best surgical works as to the method.

The medicinal treatment has in view the prevention of the formation of more similar deposits in the substance of the skin, by improving the general health. *Cod-liver oil*, *iodide of potassium*, *quinine*, and *bitter vegetable tonics*, are all useful in this respect.

RODENT ULCER.

Natural History.—A destructive ulcer, characterised by the extent and depth to which it spreads in the adjoining structures, and by the absence of preceding hardness and of constitutional affection.

They are sometimes called *lupoid* or *cancroid* ulcers, and seem to have some affinities with *lupus* and *cancer*, rather than with *scrofula*. They occur in the later half of life rather than in the earlier periods, and in this respect differ from *lupus*. For a detailed description of this disease, the reader is referred to text-books on surgery.

TRUE LEPROSY—*Syn.*, ELEPHANTIASIS GRÆCORUM.

Natural History.—True leprosy is a constitutional, non-contagious, hereditary affection, essentially chronic in its nature, expressing itself mainly by shining tubercles of different sizes, of a dusky red or livid colour, on the face, the ears (and often the extremities); the skin being thickened, wrinkled, rough, unctuous, divested of hair, and the perspiration highly offensive; in which there is loss of feeling, or other disorder of innervation, and a tendency to ulceration or death of the affected parts. The eyes, in extreme cases, are fierce and staring, and the voice is hoarse and nasal.

The position which this disease now holds in the nomenclature of the College of Physicians implies that it is of constitutional development—a theory which is now more generally accepted than the belief in the propagation of the disease by contagion. To a very great extent the disease is hereditary, and springs usually from some specific taint transmitted from parents to children.

As with other diseases of hereditary development, it sometimes passes over one or two generations, to appear in the third and fourth; and it has been found to manifest itself more in the second and fourth generations, and with much greater intensity, than in the first or third generations, and the hereditary influence is most marked on the maternal side, and more in a collateral than in a direct line.

Happily, in Great Britain, the disease is now unknown. It is one *sui generis*, characterised by certain kinds of cutaneous eruptions and discolouration, associated with a tendency to ulceration or to the death of the affected parts, and with disorders of innervation, such as *hyperæsthesia*, but more particularly by impairment or loss of sensibility (*anæsthesia*).

Two forms of the disease, the "*tuberculous*" and the "*anæsthetic*," have been described; but as the term *tubercular* or *tuberculous* is suggestive of some alliance with *tuberculosis*—which leprosy does not possess—the College of Physicians propose to designate the form in question by the term "*tuberculated leprosy;*" and inasmuch as the loss of sensibility is not confined to the "*anæsthetic*" form of the disease, the term "*non-tuberculated*" might designate the other form. But as those two forms, which have often been described as distinct, are not unfrequently known to co-exist, or to succeed one another, in the same patient, they are now regarded as modifications of one morbid condition. There are also cases included under the varieties of *non-tuberculated* leprosy characterised by white spots or blotches on the skin, and which are also more or less anæsthetic. They are sometimes named *leucopathic.* Non-tuberculated leprosy also comprehends those cases in which the cutaneous eruption consists of circular or annular spots, not unlike *lepra-vulgaris*, but in which the centre of the spot is anæsthetic, and having other distinctive characters of leprosy. These two varieties seem to be of frequent occurrence in the East Indies.

Before any visible or external mark of leprosy is seen, there are usually premonitory symptoms expressed, which continue for a longer or shorter period. A feeling of general malaise is obscurely marked and ill-defined, having no uniform or regular course. It is usually indicated by recurrent ague-like chills, or by formication and itching in the limbs, by numbness in a hand or foot, or in one or more of the fingers or toes, and by general weakness and depression alike of mind and body.

The following summary may express, in a short form, the symptoms of the two forms of leprosy:—

1. *Tubercular Leprosy* presents the following characters:—

(*a.*) Tumefaction or tubercular thickening of the skin—principally of the face and extremities, less marked over the trunk.

(*b.*) The affected skin is discoloured, dark-brown, bronzed or shining, with the sensibility much diminished or entirely lost.

(*c.*) The mucous membrane of the mouth and fauces ultimately becomes affected, and the voice altered.

(*d.*) Contraction of the fingers and toes is a frequent symptom, and the phalanges may drop off from ulcerated fissures forming over the articulations, or from *sphacelus* supervening on ulceration. The entire hand or foot may thus be lost.

(*e.*) The constitutional disturbance is much greater in this than in the other form.

2. *Non-tuberculous Leprosy.*—The anæsthetic form is the most frequent in India. It presents the following characters:—

(*a.*) Anæsthesia of the skin of the face, ears, and extremities, followed in the latter case by atrophy, interstitial absorption, and occasionally ulceration of the benumbed parts, notably of the fingers and toes, with little or no constitutional disturbance.

(*b.*) Large circular superficial ulcers may form on the lower extremities.

(*c.*) The affected fingers and toes become contracted, the joints enlarged, the ends of the fingers broad, flat, or clubbed.

Treatment.—The only hope of exterminating leprosy lies in the adoption of hygienic measures tending to improve the general conditions, physical and moral, of the leprous poor. Medicinal treatment is of no avail, unless combined with the regular use of a nutritive unstimulating diet, suitable clothing, protection against the vicissitudes of the weather, personal cleanliness, and exercise in the open air. The medicines which have been found of most service are tonics and alteratives, especially preparations of iron and iodine. An emulsion of *Gurjon wood oil* with *lime water* is well spoken of by Surgeon-Major Dr. J. Dougall, in the anæsthetic form of this disease. Mercury is extremely injurious.

The systematic use of baths, simple, saline, or sulphuretted, are decidedly beneficial.

Cupping-glasses or moxas, along the line of the spinal column, have been of marked advantage in relieving the lesions of innervation, whether of increased or diminished sensibility.

SCROFULA.

Natural History.—The diseases with which the name of scrofula is associated are manifested by a remarkable tendency to certain forms of nutritive disorder, and hence they are strikingly wasting in their effects upon the body. They comprehend the following specific forms, namely:—(*a.*) *Scrofula*, with *tubercle;* (*b.*) *Scrofula*, without *tubercle;* and certain local scrofulous affections, such as *tubercular meningitis*, *scrofulous ophthalmia*, *tubercular pericarditis*, *scrofulous diseases of glands*, certain forms of *phthisis pulmonalis* or *pulmonary consumption*, *acute miliary tuberculosis* or *hydrocephalus*, *tabes mesenterica*, *tubercular peritonitis;* each of which will be considered in its proper place, under the local diseases of the organs affected.

Many of these are characterised by the growth of a peculiar substance in the tissue of some organs rather than in others, to which the name of *tubercle* has been given. These growths occur in the tissue of the alimentary canal; in the peritoneum, arachnoid, or pleura; in the lungs, liver, spleen, or kidney; in the tissue of the lymphatic glands, especially the cervical, inguinal, and mesenteric glands; and sometimes in the pancreas and the tonsils.

These lesions owe their existence to constitutional conditions. There can be no doubt that, in the condition of *scrofula with tubercle*—the *tubercular* or *wasting* diseases—as well as in those in which *scrofula* is expressed *without tubercle*, there is a *latent* condition existing before the tubercles are apparent in the one case, and a scrofulous diathesis in the other.

The relation of the nutritive and other morphological changes between the solids and the fluids of the body has everything to do with the development of the scrofulous state. In cases where the tendency to the growth of *tubercles* is hereditary, the operation of agents from without act as stimuli or excitants to the growth of them.

Ever since scrofula has become more studied as a constitutional affection, it has been rendered more apparent that impairment of the digestive organs is the primary disorder of function which ushers in the cachexia, and that a certain form of dyspepsia is not only present in the hereditary strumous constitution, "but is capable of generating the bad habit of body, and of leading ultimately to the growth of tubercle."

Treatment is founded on the doctrines—(1.) That scrofulous local lesions will heal of themselves, if the nutrition of the system can be maintained and the continuous growth of tubercle arrested; (2.) that the periods of frequent temporary arrest of all the general and local symptoms of disease ought to be diligently taken advantage of to improve and preserve health by hygienic means; (3.) that the efforts of the practitioner should be directed to the digestive rather than to the pulmonary or any other system locally affected; (4.) that the kind of morbid nutrition in the body generally, and altered morphological change in the tissues of the organ where the deposit takes place, appear to be chiefly due to excess of albuminous and deficiency of fatty elements in the chyle.

The treatment, therefore, to be pursued must be essentially reparative of the waste of tissue generally; corrective of what has been unfit in the individual diet and mode of life; and, lastly, supplementary of the elements of nutrition, which have been deficient.

During the past *thirty* years in Germany, and *twenty-three* years in this country, the treatment of scrofulous affections has gradually but steadily become more and more firmly based on those pathological doctrines which Dr. Bennett, of Edinburgh, was mainly instrumental in first elucidating, and in earnestly recommending to the notice of the profession generally in this country. The view here taken regarding the nature of scrofula leads to the belief that—(1.) The blood is impoverished through the preliminary dyspepsia which precedes the growth of tubercle; (2.) that in *pulmonary phthisis* the growth of tubercle results from the exudation of lymph and of new growth in the gland tissue of the lungs; (3.) that the successive formation and softening of these tubercles lead to ulcerations of the pulmonary and other tissues, and promote wasting of the body generally.

The indications of general treatment are therefore—

First, To improve the faulty nutrition, which is the cause of the scrofulous cachexia, and of the exudations assuming the characters of tubercle.

Second, To subdue the fever which attends the growth and changes going on in the tubercle-nodules, and to favour the absorption either of the entire exudation, or of such portions of it, that what remains may undergo such changes as are consistent with its future harmless existence in the organs or other parts where it may have grown.

Third, To prevent the recurrence of fresh exudation by careful attention to hygienic regulations, especially during the intervals of apparent return to health.

Tonic treatment consists essentially in the adoption of those means which promote or stimulate the healthy nutrition of the body. Its elements exist in fresh air, abundant exercise, sufficient repose, and judicious diet.

I. A supply of pure and fresh air for respiration is constantly required by the tuberculous patient.

II. Active exercise in the open air is imperatively demanded by the tuberculous patient.

III. It is important to secure for the patient a uniform, sheltered, temperate, and mild climate to live in, with a temperature about 60° and a range of not more than 10° or 15°; where also the soil is dry, and the drinking-water pure and not hard.

IV. The dress of the scrofulous patient ought to be of such a kind as to equalise and retain the temperature of the body.

Under this topic waterproof coats, boots, and shoes are to be condemned. Flannel ought invariably to be worn next the skin in all seasons; and in winter a chamois leather vest may be required over the flannel.

V. The hours of rest should extend from sunset to sunrise.

VI. Indoor or sedentary occupation must be suspended; but outdoor employment in the fresh air, even in the midst of snow, has been and may be advantageous.

VII. Cleanliness of body is a special point to be attended to in the hygienic treatment of tuberculosis.

VIII. Marriage of consumptive females, for the sake of arresting the disease by pregnancy, is morally wrong and physically mischievous.

IX. The medicinal treatment must be adapted to the site of the local deposits and the general nature of the particular case.

Medicine is utterly powerless and useless, unless the hygienic means now insisted upon are carried out to the uttermost.

RICKETS.

Natural History.—A constitutional disease of early childhood, characterised by an unhealthy state of the system, which precedes for several weeks or months a peculiar lesion of the bones, manifested by curvature of the shafts of long bones and enlargement of their cancellous extremities. Some of the solid visceral organs exhibit also peculiar lesions. The growth of the bones is characterised by irregularity, by non-solidification of their growing layers, and by the progressive formation of medullary cavities in the old bone, thus rendering the bony laminæ thin and brittle. In the solid visceral organs, such as the spleen and liver, there is generally lardaceous disease.

The actual changes in the bones consist—(1.) In proliferation of the cartilages and epiphyses, and of the periosteum—the sources of the normal growth in length and thickness of the bones. (2.) The cartilaginous and fibrous tissues ossify more densely, and at a later period than in the normal growth of bone. The tissues remain abnormally soft for a length of time, after which they become abnormally hard. The retarded ossification is probably due to a diminished supply of chalky salts; and the most probable hypothesis regarding the cause of rickets is that which refers it to inflammation of the epiphysal cartilages and periosteum, and local disturbance of circulation hindering the deposits of calcareous salts.

The earliest recognition of the cachexia associated with rickets is rarely apparent before the fourth month of infant life, and usually between the fourth and twelfth months. It does not in general declare itself until the child first begins his attempts to walk, or until he shews suffering during the first dentition; and at first the progress of the disease is so very slow as almost to be imperceptible.

The symptoms may be arranged into four classes:—(1.) Those which are common to many diseases—symptoms which might arise from deranged digestion, from improper food, or from tuberculosis, and which are often referred to the "irritation of teething," or to the so-called "infantile remittent fever." These phenomena always denote the precursory or incubative stage of rickets; (2.) those which at once mark the nature of the disease, render its diagnosis easy, and which enable us to predict that the bone affection will shew itself; (3.) the stage of characteristic deformity; (4.) phenomena of favourable or of unfavourable import, inasmuch as they characterise a period of restoration to health, of irremediable atrophy of the body, or of approaching dissolution.

Treatment.—Ventilation of the room in which the child lives is of first importance. *Milk* diluted with *lime-water* (about a fourth part), and a teaspoonful or two of cream added, is the best of food. Sugar ought not to be added to the milk. *Liebig's food for children*, and *Parrish's chemical food* are both valuable agents in the dietary. About once a week a dose of *rhubarb*, *soda*, and *calumba*, in equal parts, should be given, followed next day by a teaspoonful or more of *castor oil*. *Prepared chalk* and *soda* may also be given twice or thrice a day. When the febrile disturbance is subdued, the child should live as much as possible in the open air. *Vinum ferri* ought then to be given, or small doses of the *syrup of the phosphates of iron*, *quinine*, and *strychnia*, along with the food, or just before meals. *Cod-liver oil* is of essential service; but the stools ought to be examined daily; and if any of the oil passes by stool its dose ought to be diminished, or its administration suspended for a time. (For details on *rickets* and its treatment, consult the admirable lectures of Dr. Jenner, in *The Medical Times* of 1860, vol. i.)

CRETINISM.

Natural History.—Cretinism implies a condition of imperfect development and deformity of the whole body, especially of the head. It is endemic in the valleys of certain mountainous districts, attended by feebleness or absence of the mental faculties and special senses, and is often associated with goitre. The condition of idiocy named *cretinism* (and associated with goitre in many districts) is of great interest; but the relations of the two are not yet clearly understood. The idiocy of *cretinism* is associated with deformity and imperfection of the bodily organs, the brain, in common with other parts, participating in the imperfection and deformity. The affection of the mind varies from mere obtuseness of thought and purpose to the most complete obliteration of all intelligence.

Three *varieties* are to be distinguished:—

"(*a.*) *Complete Cretinism*—synonym, *Incurable Cretinism.*—Cretinism characterised by idiocy, deaf-dumbness, deficiency of general sensibility, and absence of the reproductive power.

"(*b.*) *Semi-Cretinism.*—A degree of cretinism in which the mental faculties are limited to the impressions of the senses and the bodily wants; the general sensibility is obtuse, the head is badly formed and drooping, the speech is rudimentary, and the reproductive powers are feeble or absent.

"(*c.*) *Incomplete Cretinism*—synonym, *Curable Cretinism.*—A degree of cretinism in which the mental faculties, though limited, are capable of development; the head is moderately well formed and erect, the special senses, the faculty of speech, and the reproductive powers are present."

With but few exceptions, *cretins* are goitrous; and it has been said that when both parents are goitrous for two generations in succession, the offspring, being the third generation, are sure to be cretins (WATSON).

Treatment.—The indications of treatment are those which suggest improvement in all hygienic measures for the prevention of the disease. Once established, the condition of the cretin can only be ameliorated by institutions similar to those founded by Dr. Guggenbühl of Zurich. The condition is beyond medicinal remedies.

DIABETES—*Syn.*, DIABETES MELLITUS.

Natural History.—A constitutional disease obviously produced through errors in the processes of assimilation either in the stomach, in solid organs, or in the blood, and characterised especially by an excessive discharge of urine, more or less constantly saccharine, excessive thirst, and associated with progressive emaciation of the body. From the time of Charles II. of England, when Dr. Thomas Willis first observed the saccharine character of diabetic urine, no disease has had its nature more inquisitively examined, and with more interesting and instructive results. The abnormal state of the urine naturally at first led the inquiry towards the kidneys. They have been industriously examined, both as to their structural and functional relations, but without elucidating the nature of the change in the urine in all kinds of cases.

Although this disease has hitherto found a nosological place under diseases of the kidneys, the researches of Bernard, Parkes, Pavy, Ringer, and others, very clearly shew that amongst them it is misplaced. If the disease is to be regarded as a local one, it should rather come under *hepatic* than *nephritic diseases;* but the weight of evidence clearly shews that *diabetes mellitus* belongs to the *constitutional* class of diseases, and cannot be referred to any one single morbid state. There are great varieties in cases of diabetes as to its pathology.

No constant lesion is found in cases after death. There is no remarkable lesion in any part of the nervous system. Sometimes the floor of the fourth ventricle is diseased and sometimes healthy—nothing is constant. In some cases the brain has been found in a minutely cystic condition.

The pancreas is very often hypertrophied. The walls of the stomach are thickened, chiefly through muscular hypertrophy, with the mucous membrane thickened and softened.

The lungs almost always contain caseous deposits, or are in a condition, the result of a chronic inflammation, by which the lung tissue is broken down and cavities form, and not unfrequently there is pneumonia or gangrene.

In about half the cases the kidneys are enlarged, and sometimes are in a state of chronic parenchymatous inflammation, as in some forms of Bright's disease.

The liver usually appears normal, but is sometimes congested with blood. The bile resembles a mixture of rhubarb, and deposits a copious sediment of columnar epithelium and yellow amorphous granular-looking matter.

The early symptoms of *diabetes mellitus* are obscure. Dr. Prout believed that there is a stage which precedes the formation of sugar, and which is marked by a superabundant and highly dense urine, loaded with an excess of urea. But much uncertainty prevails on this point, and nothing is assured except that the constitution is not greatly affected till the saccharine matter forms, and is eliminated by the urine. In some very few instances, the quantity of urine passed is hardly greater than in health; but more commonly it is in great excess, amounting to eight, ten, sixteen, thirty, and even more pints during the twenty-four hours; so that the patient is incessantly disturbed in the night, and loses his sleep, while the urethra and its orifice become inflamed and sore.

The onset of the disease is thus generally insidious and unobserved. There may be a sense of general discomfort, some emaciation may declare itself, while constant thirst and frequent micturition become well-marked symptoms. At this period the general health begins to give way; thirst is intense, and the patient often drinks many quarts, or even gallons, in the course of the day. The appetite is capricious, but generally excessive and voracious, the skin harsh and dry, and the patient becomes greatly emaciated, and loses sexual desire and sexual power. Almost all the water drunk passes off by the kidneys, and the insensible perspiration is diminished both by skin and lungs. The intestinal excretion of water is also greatly lessened; hence the bowels are costive and the fæces dry and hard. The water is not passed off by the kidneys so soon as in health. If a diabetic person drink water in the morning, the urine may not be increased till mid-day; but if grape-sugar be added to breakfast, the urine is passed as rapidly as in health. In advanced cases the drain upon the constitution is so great that the alveolar processes are absorbed, and the teeth, loosened in their sockets, are apt to fall out. These symptoms are much relieved by medicine, and life much prolonged; but often, when the case appears most favourable, lung destruction becomes apparent, and the patient sinks under this disease.

When *diuresis* is considerable, the urine should invariably be examined, and its constituents determined. A faint sweetish odour may be perceptible in diabetic urine, comparable to fresh hay or milk. The chamber-vessel should be examined for crystals of sugar which may have been formed. The best evidence, however, is that derived from chemical tests; and one of the most useful is a modification of Fehlings', given by Dr. Pavy—caustic potash being substituted for caustic soda. The following are its component ingredients:—*Sulphate of Copper*, 320 grains; *Tartrate of Potass* (*neutral*), 640 grains; *Caustic Potash* (*potassa-fusa*), 1,280 grains; *Distilled Water*, 20 fluid ounces.

Dissolve the sulphate of copper in ten ounces of the water, and the tartrate of potash and caustic potash together in the remainder. The copper solution is then poured into the potash solution, when no precipitate will take place—the liquid obtained being of a clear, bright, and beautifully deep-blue colour. Prepared with the utmost exactitude, as it ought to be, it may be employed for determining the *quantity* of sugar, as well as its presence in the urine. The *quantity* of sugar is estimated by its reducing effect upon the test solution, which is of such a strength that 100 minims are just decolorised by half a grain of grape sugar. This is known as the *Cupro-potassic Test for Sugar.*

The density of diabetic urine is also one of the best indications of sugar being present. Diabetic urine varies in density from 1·030 to 1·074; but on an average, and tolerably constantly, it is 1·040; and when the urinometer stands above 1·030, we may suspect that sugar is present. The quantity of sugar present has been calculated in urine of density 1·020, to be 402 grains in every pint, while at 1·050 it contains 958 gains of sugar—the increment being one scruple, or nearly so, for every degree of specific gravity between the extremes that have been mentioned. If these data be correct, a person passing sixteen pints of urine daily, of specific gravity 1·050, actually passes nearly two pounds avoirdupois of sugar. But the amount varies greatly, amounting sometimes to *one* pound or *two* pounds, or even two and a half pounds, in twenty-four hours. In a few months patients will thus pass their own weight in sugar. Its amount is mainly influenced, in the first instance, by the saccharine and amylaceous nature of the food, which always augments the amount of sugar. The augmentation is quite perceptible about two hours after food, and continues for four or six hours, if the amount of starch taken has been considerable.

Treatment.—A mixed diet, if contra-indicated by some theories, is at least the best to adopt in practice, if duly regulated and aided by other means, and is consistent with the pathology of the disease. It will be evident, however, that those vegetables which contain a large quantity of saccharine matter should be avoided in some degree, as potatoes, grapes, or other very ripe fruit, and, *à fortiori*, sugar itself.

There are certain fixed broad principles upon which the disease is to be treated. In all cases the various influences of the stomach, liver, skin, and kidneys on the nervous system and on each other, ought to be sought out and determined, and the basis of treatment arranged accordingly. It is necessary to abstain from all amylaceous food, as well as from every solid and liquid containing sugar, or any substance readily convertible into sugar. Fat meat and eggs may be taken, if biliary derangement is not induced by them, and fish is a most important article with which to vary the monotony of the dietary. Milk also may be indulged in occasionally, as it is not found that the sugar it contains is readily converted into glucose. Its influence, however, requires watching. The treatment also by *skimmed* milk has been very successful in some cases, in the hands of Dr. Donkin, who brought it into notice. It is desirable to vary the food as much as possible during the day, taking the lighter kinds in the later meals. When soups are taken, they ought to be really good, and flavoured with aromatics or onions, to the exclusion of carrots, turnips, and pease. They may be thickened with some bran *finely powdered.* Lettuces Dr. Camplin found to agree well, when eaten sparingly with oil and vinegar, or with a little salt only, if the vinegar is likely to disagree. Pickles in small quantities may be permitted to convalescents. If cocoa agree, it may be taken, prepared *from the nibs* only. With regard to drinks: if milk is found to agree, it may be used as a drink, combined with half its bulk of lime-water, or in the form of what is known as "buttermilk" in Scotland and in Ireland, but which in England is generally given to pigs, not being sufficiently appreciated by natives of the country south of the Tweed. Dr. Camplin eventually found it necessary to abstain from all alcoholic drinks; but, where they are found desirable or necessary, a selection may be made from those wines and spirits which are freest from sugars. Of these, clarets may be chemically considered the best, then Burgundy. The so-called "fruity wines" must be entirely interdicted; and of all alcoholic beverages *weak* brandy and water is the safest. The amount of brandy must be always *measured* and taken as directed by the medical attendant. A *teaspoonful* in a tumblerful of water is generally sufficient for an ordinary dinner drink; and Dr. Camplin candidly and feelingly observes, from his own experience, that no diabetic need expect to recover or continue well who cannot exercise self-control, and make up his mind to be temperate *in all things.* No two cases of diabetes can be treated exactly alike. Of medicinal sedatives *codeia*, in one-fourth to one-half grain doses night and morning, in a pill, has been most successful.

PURPURA.

Natural History.—Purpura is a disease not unusually attended by fever, characterised by purple spots of effused blood, which are not effaced by pressure, and are of small size, except where they run together in patches.

By some purpura has been considered identical with scurvy, and been named "*land* scurvy." Others have considered it a simple disease of the skin—the *purpura simplex* of Willan and Bateman. Authors generally have spoken of the disease under the name of *petechiæ sine febre*, because the spots are not connected with continued fever. The disease is very closely related to *hæmorrhages* as a morbid state on the one hand, and to *scurvy* on the other.

Two varieties are distinguished, namely:—

(*a.*) *Simple*, and

(*b.*) *Hæmorrhagic*, which latter is thus defined by the College of Physicians of London—"The disease when accompanied by hæmorrhage from a mucous surface."

It has not been determined what is the nature of the morbid state essential to purpura. In some cases the urine has been observed to contain an excess of albuminous matter, with a deficiency of urea. The blood has been found deficient in coagulating power. A peculiar source of danger is the occurrence of extravasation of blood into the internal organs. The lungs, the brain, the liver, and the alimentary canal are the most frequently affected. Purple spots and effusions of blood are to be found on the serous membranes, as in the *arachnoid*, the *pleura*, the *pericardium*, the *peritoneum;* and occasionally the blood lies coagulated in the cavities of these membranes. It has also been found in the bladder and in the calyces and pelvis of the kidney.

Instances occur in which blood oozes, or is discharged more or less copiously, from the mucous membranes, without affection of the skin; and to this class of cases, as a form of disease now under consideration, are to be referred those cases of profuse or fatal hæmorrhage from slight causes, recorded under the name of "*hæmorrhea*," which have been ascribed to a *diathesis* termed the *hæmorrhagic*, and which is supposed to be hereditary. When the disease is protracted the patient becomes of a sallow complexion, waxy coloured, and dingy; anasarcous swellings, gangrenous and bad sores appear on the feet and legs, general anasarca prevails, and he dies exhausted.

Various symptoms, denoting general disorder of the constitution, precede the appearance of the *petechiæ*, generally by some weeks, such as languor, which is oppressive, weariness, faintness, and gnawing pains at the pit of the stomach. The appetite is variable, generally weak, but sometimes there is an inordinate craving for food, which, when eaten, is said to lie like a weight upon the stomach. The tongue is yellowish, and coated with a viscid fur, the countenance is sallow or dingy, or has a bloated, pale appearance, with swelling underneath the eyelids. The purple spots appear first on the legs, and afterwards, without any certain order, on the thighs, arms, and trunk of the body, and their presence is attended with much weakness and great depression of spirits. No degree of pressure alters the colour of the spots, and they are distinguished from flea-bites by the absence of a central puncture. At first the spots are bright red, but in a day or two they become purple, afterwards brown, and when they are about to disappear they assume a yellowish tint. When the disease continues for a long time, all these varieties of colour may be seen on a patient at the same time.

The pulse is feeble, and generally a good deal quicker than natural. Deep-seated pains are felt about the epigastric region, as well as in the chest, loins, or belly. In some instances giddiness and lightness of the head prevail, especially when attempting to move or stand erect, and there may be even dull pain in some part of the head. Constipation of the bowels, palpitation and irregular action of the heart, with a tendency to frequent syncope, are the most distressing and dangerous symptoms.

Treatment.—To treat this disease with success, it is necessary to ascertain the circumstances under which it becomes developed in each particular case. *Quinine* or *bark*, *stimulants*, *mineral acids*, *nutritious food*, *wine*; and *oil of turpentine*, administered in moderate and repeated doses, has been recommended. The tincture of *larch bark*, as a styptic and carminative tonic, is "one of the most elegant forms of prescribing a terebinthinate." *Fifteen drop doses* of the tincture may be administered every hour, or *eight or ten drops three times a day*, afterwards increasing the dose according to the age of the patient and the necessities of the case.

SCURVY.

Natural History.—The earliest symptoms of scurvy are a change of colour of the skin, particularly of the face and eyelids. This is sometimes the first and only sign of the disease. The skin round the orbit may be puffed up into a bruised-coloured swelling. At the same time there are vague, wandering rheumatic-like pains in the limbs, weariness, depression of spirits, and a longing for fresh vegetables and fruits. With these pains, however, there is no fever; the pulse is soft and natural, and the temperature of the body lower than usual, and great disorder of the respiratory function may supervene. The countenance appears pale or yellow, and bloated; there is great depression of the physical powers, followed by swelling of the gums, which become soft, spongy, and hang over the teeth in large fleshy-like palmated masses, very much disposed and readily excited to bleed; and the edges of the gums are purple where they are in contact with the teeth. Several old observers state, and Fauvel confirms the observation, that in old people without teeth these vegetations do not occur, and the gums remain comparatively unaffected. In one case he noticed that a single remaining tooth was surrounded by a mass of swollen gum; the tooth was extracted, and the gum immediately became level and firmer, while the other symptoms preserved their intensity. The swollen and fungus gums have always appeared to be much more intense in cases occurring on shipboard; and it is not improbable that they are affected peculiarly because they are exposed to pressure, bruises, and attrition; sometimes they are severely ulcerated.

All parts suffer from pressure in cases of scurvy—the merest rub causes an ecchymosis, the slightest possible blow produces an extensive bruise, and the gums may suffer much from the causes already noticed. A small eruption (like flea-bites) of a purple hue is to be seen on the lower extremities; and about the same time the muscles of the leg or thigh become hard and painful, and in a day or two the skin over the pained part becomes first yellow and then purple. This discoloration forms patches sometimes as big as the palm of the hand, and may extend over half the leg and thigh. The popliteal regions are a frequent site of this pain and discoloration, sometimes attended with œdema, especially of the ankles and feet. The discoloration is especially apt to shew itself in the situation of old cicatrices and injuries. "These extravasations are both superficial and deep-seated. The *superficial* are,—(1.) *Dermic*, and (2.) *Subdermic*. The *dermic extravasations* vary in size from small, dark-coloured spots to large blotches; they may be distinct, or may come together at some point of their circumference. The anatomical site of the spots is the hair follicles or sudoriferous canals, the structure of which hinders the diffusion of the sanguine serosity. The epidermis becomes dry, rough, and raised in scales, resembling the skin of a recently-plucked fowl, and the sudatory function is diminished or suspended. Subsequently desquamation takes place. The solid part of the blood may, however, remain infiltrated in the meshes of the dermis, forming brown spots, which may last for months, the epidermis over these being smooth and shining."

The tongue is white, the breath fetid, and the stools generally pale. As the disease advances, all these symptoms are aggravated. The loss of physical power increases, the purple spots have a tendency to ulcerate, and the ulcers are distinguished from all others by their putrid fungoid appearance and great tendency to bleed; old sores open, and the callus of broken bones has been even dissolved and their ends separated. Profuse hæmorrhages frequently take place from the mouth, nose, lungs, or bowels, sometimes from *bullæ*, which form and burst (discharging blood) on the mucous surface. The teeth become loose, so that they either fall out or may be taken out by the finger and thumb. *Ptyalism* is not uncommon in scurvy, with swelling of the parotid and sub-maxillary glands. The pulse hurries on to 120 or 140; and at length the patient sinks from diarrhœa or dropsy, with so extensive effusion as to cause sudden death.

The duration of the disease is generally many weeks, and sometimes under the most favourable circumstances many months, the patient recovering his strength very slowly. When the disease follows ague, obscure or irregular remissions or intermissions of febrile symptoms are observable, and more or less enlargement, with pains in the region of the spleen, is often detected. From the commencement of the disease the alvine evacuations are more or less disordered, but the change may not attract attention. At first costiveness prevails, but subsequently the stools become much more frequent and very offensive. Diarrhœa, with colicky pains, supervenes, and, with more or less attendant hæmorrhage, the patient rapidly sinks beyond hope of remedy. Dysentery frequently supervenes upon the scorbutic state, more especially when dysentery is epidemic; and this combination of maladies is sometimes termed "*scorbutic dysentery.*" The tongue, pale at first, becomes broad, flabby, and indented at the edges of the teeth. The great poverty of the blood causes the mucous membrane of the tongue and inside of the lips and cheek, as well as of the skin, to have a peculiar paleness, which contrasts remarkably with the appearance of the gums The eyesight is frequently weakened, and night blindness (hæmeralopia or nyctalopia) has frequently been observed as a commencing and concomitant symptom; and a most distressing state is the inability to sleep at night.

Treatment.—The early history of navigation, as it records the greatest ravages of scurvy, so does it also record the best antidote to the disease. Of four ships which sailed from England in the beginning of April, 1609, for the establishment of the East India Company, they were all so severely visited by scurvy as to have lost nearly one-fourth of their crews when they arrived at the Cape of Good Hope. The crew of the Commodore's ship was not attacked. This immunity arose from three table-spoonfuls of lemon juice having been served daily to each of his men. But notwithstanding this evidence of the success of lemon juice in preventing scurvy—evidence the most conclusive—this valuable remedy and preventive was altogether slighted for a hundred and fifty years afterwards. In pure cases of scurvy, the blood, and the blood only, is at fault. "Lemon juice," writes Dr. Watson, "is really a specific against scurvy, whether it be employed as a preventive or as a remedy. It supplies something to the blood which is essential to its healthy properties." The potato seems to be no less efficacious as a remedy and preventive. The reader will find a most interesting account of the efficacy of potatoes and of onions in Dana's *Two Years before the Mast*—a book well worth reading. The antiscorbutic principle, whatever it may be, is in greatest amount in unripe fruit; it lessens gradually as they ripen; and if the juice be obtained, it disappears when fermentation occurs. When lime juice becomes musty, a mucilaginous principle is developed at the expense of the citric and malic acids; and the *percentage* of citric acid gradually decreases. Good *lemon* juice seems to be more effectual, however, than pure *citric* acid; probably from its containing *malic* and *tartaric acids*, besides *citric*, and from the *citric acid* being in the form most easily absorbed and decomposed by the digestive organs of man. And with such remedies at command, the prevalency of scurvy in *merchant vessels*, or in any Navy, ought not to exist.

ANÆMIA.

Natural History.—A special morbid state in which there is either a relative diminution of the mass of blood with the general composition of the blood differing from the normal standard; or in which the mass of blood is diminished, and the liquor sanguinis is watery, poor in albumen, and containing an excess of salts. These conditions, co-existing with relative deficiency of the red blood-corpuscles, and a diminution of the urine-pigment, constitute anæmia.

The term *anæmia* literally means absolute *deficiency of blood*—a condition of existence obviously not possible. A diminution in the quantity of blood, with an alteration in its composition, almost never occurs alone, but is generally a morbid state resulting from many exhausting morbid processes peculiar to such wasting constitutional diseases. In many of these diseases the blood-mass is evidently diminished. There are indications of this diminution in the small pulse, in the pale bloodless appearance of the countenance and surface of the body generally, especially seen in the lips and gums, and in the small blue collapsed veins, particularly obvious by contrast on the pallid skin. In such cases one would never think of drawing blood to know whether or not its constitution was changed; but in cases where the opportunities for examination have occurred, the blood-corpuscles have almost always been found relatively diminished; and accordingly the College of

Physicians of London define anæmia simply as "*deficiency of red corpuscles in the blood.*" The causes which lead to this diminution are obscure; and at one time the spleen and glands have been held as concerned in bringing about the disease by some abnormal exercise of their functions.

The result of this morbid condition of the blood chiefly betrays itself —(1.) upon the *vascular system* generally; and (2.) upon the *metamorphoses of tissues.*

The blood-vessels contract in proportion to the diminution of the blood-mass. The *arteries* contract generally; and the pulse, whenever it can be felt, is found to have become small and tense. The *capillaries* also contract, the skin and mucous membranes becoming pallid and comparatively bloodless. The *heart's* action in extreme cases becomes irregular, and the whole circulation generally is disturbed.

As regards the metamorphoses of tissues, the muscles and the nervous system appear to suffer first; debility and prostration, both bodily and mental, occur; and in severe cases sensation may be lost, syncope is frequently apt to occur, and even death may result.

Those exhausting diseases which are attended especially with deranged nutrition and sanguification, such as *Bright's disease*, *carcinomatous diseases*, and *suppuration*, lead also to the development of that form of anæmia in which the *liquor sanguinis* is in excess, in which the blood is poor in albumen, containing an excess of salts, and in which the blood-cells ultimately become deficient. A tendency to *general dropsy* or to diarrhœa ensues, nutrition becomes still more disordered, and new formations are apt to become developed.

Diagnostic characters of *anæmia* have also been recognised in various *murmurs* which may be heard in some parts of the vascular system of anæmic patients. There are three kinds of anæmic *murmurs* which may be distinguished, namely—(1.) *Cardiac murmurs;* (2.) *arterial murmurs;* and (3.) *venous murmurs.*

Treatment.—The energies of the physician must be directed to discover and counteract the cause of the anæmia. Nutritious substances must be supplied for diet, in the shape of easily digested meat and broths. The purely tonic treatment, in the combination of air, exercise, and diet, must be carried out as far as practicable. A change of air is absolutely necessary, and generally also of diet. Iron is one of the best medicinal remedies. The astringent preparations are pre-eminently tonic; and are especially useful when the anæmia is associated with or dependent upon inordinate discharges. *Solution of the perchloride of iron* (*tinct. ferri perchloridi*), in doses of ten to twenty minims in *water*, *infusion of quassia*, or *calumba;* and if the anæmia is associated with *diarrhœa*, *menorrhagia*, or *leucorrhœa*, the solution of the *pernitrate of iron* is a remedy generally attended with great benefit. For delicate females and children the *saccharated carbonate of iron* is a most valuable preparation, in the form of *mistura ferri composita*, to the extent of one or two ounces for a dose; or in the form of the *pilula ferri carbonatis*, in doses of from five to twenty grains in the twenty-four hours. The *citrate of iron and ammonia* is another remedy which possesses scarcely any astringency, and may often be given in cases of anæmia when the stomach will not bear more astringent preparations. Five to ten grains of this salt may be taken during the twenty-four hours. It is best taken during effervescence, prescribed in *solution of citric acid* and *not* in *bicarbonate of potash solution.* If it is put into the latter, carbonic acid will be given off, and probably burst the bottle. *Tincture of orange-peel* is the best flavouring agent; but as the salt will not dissolve in the tincture alone, it is necessary to dissolve the salt in water first, and then add the tincture, otherwise the division into doses is impracticable.

CHLOROSIS—*Syn.*, GREEN SICKNESS.

Natural History.—A very indefinite idea is associated with the name and nature of this disease. Many employ the term precisely in the same sense as *anæmia;* or they limit the term *chlorosis* to those forms of anæmia whose causes are unknown. The original use of the term is limited to that form of anæmia which occurs in the female at the period of puberty. It is to be classed amongst the "functional diseases of the female organs of generation in the unimpregnated state." It mainly consists in a deficiency of the blood-cells, with redundancy of the serous part of the blood, occurring in young girls at the age of puberty, and sometimes in the young of both sexes before the complete development of the distinctive characters of the sexes towards puberty has been effected.

A change in the complexion constitutes the most striking symptoms of chlorosis. A marked pallor of the skin prevails, sometimes perfectly pale, at other times yellowish, greenish, or waxen coloured. The lips and mucous membranes are also pale—symptoms which are the result of the deficieny of blood-cells, and so of blood-pigment. Slight dropsical swellings occur, such as œdema of the feet and ankles, the face and the eyelids, and a bluish halo sometimes encircles the orbit.

The temperature of the body is generally diminished—the breath is cool, the lips, nose, ears, hands, and feet are cold; and chilliness of the body prevails, which is morbidly sensitive to external cold, and seeks warmth. The patient suffers from great prostration of strength and debility; is languid, listless, sedentary, and indisposed to exertion.

Hysteria may prevail with chlorosis, and the nervous system generally is always more or less implicated. Disorders of digestion attend the disease. Constipation frequently and obstinately co-exists; but afterwards diarrhœa may alternate, and lead to *hæmatemesis* or *melæna*, when the evacuations are usually scanty, dark-coloured, and fetid. A singular and peculiar pain of one or both sides, which suffer together or alternately, is a frequent symptom. It is referred generally to the region over the false ribs and the *ilia*. The recurrent nature, the particular situation, and the alternating character of the pain, are peculiar and characteristic.

Breathlessness prevails, and is experienced especially on any exertion; sometimes also fits of dyspnœa; and sometimes a sonorous cough occurs, and the breath is offensive. Menstruation is generally absent or performed imperfectly, irregularly, and with pain, and the flow is thin and watery, or leucorrhœal. The condition of the menstrual discharge is generally very easily impaired. The catamenia become irregular in their return, inconstant, or of short duration in their flow, deficient in quantity, pale in colour, and terminating in a state of leucorrhœa. In some cases each return of the catamenia is preceded and attended with much pain in the back and in the region of the uterus. Later in the disease there may be complete *amenorrhœa*.

The pulse may be slow, feeble, and soft, but sometimes frequent, and is always easily accelerated; the heart and great vessels are irritable; palpitation is common; or, more frequently, a sense of fluttering in the *præcordia*, with irregular action of the heart, or imperfect syncope and anæmic murmurs may prevail. Apart from mere lassitude and palpitation, patients are sometimes chlorotic for weeks, without any other marked symptoms; and the same complication of intercurrent acute diseases is apt to happen as described under anæmia. The condition of the urine is similar to that which prevails in anæmia.

Diagnosis.—It is especially necessary that the physician should not confound *chlorosis* with *jaundice* on the one hand, or *disease of the heart* on the other, or with incipient *pulmonary tuberculosis*, or inflammation within the chest or abdomen.

Treatment is chiefly conducted by change of air and diet, and by medicines. All the functions of the body must be carefully watched and regulated. The residence of the patient must be a healthy spot in the pure air of the country, rather than the town. Dry frictions of the back and limbs are also recommended, with bathing in the sea, where it can be borne, and a morning sponge bath as a habit.

The food must be regulated so as not to be too stimulating nor disgustingly bland—frequent change is demanded, with a due attention to the proper apportioning of nutritive and respiratory elements. The diet should be carefully apportioned to the powers of digestion. Any symptoms of dyspeptic oppression, impaired digestion, or offensive stools, demand a careful re-adjustment of the dietary. Three meals, or perhaps four, may be taken during the day—the intervals between the meals being equal; and, half an hour before each of the meals, two grains of *capsicum*, with one grain of *quinine*, may be given in a pill. The breakfast should consist of biscuit, dry toast, or stale bread, with fresh butter, and perhaps an egg, and one small cupful—not more—of hot black tea. Five or six hours after breakfast, and after the pill, a dinner of *well-done* meat, such as mutton chops, may be eaten with potatoes; porter, beef-tea, or milk being taken for drink, according to taste and the powers of digestion. The evening meal may be similar to the morning. At first there may be a loathing of all kinds of food in the form of regular or "ordinary diets." In such cases no meals should be prescribed, and no solid food; but a cup of milk, with a third part of lime-water in it, may be given every two hours, and a pint of beef-tea in divided doses may be taken as a drink during the day. This diet may be gradually added to as the appetite improves.

Of medicines, the preparations of iron have most reputation. They seem to act by promoting the formation of the red blood-corpuscles; and they operate best in those cases in which the blood is rich in albumen. They also act as stimulants in digestion. Almost every physician has some preparation of iron he fancies better than another; and some of them seem to be aided in their good effects by combination with *carbonate of potash*, such as the *sulphate of iron*, in doses of *three* to *five* grains, or of the *ferri sulphus exsiccata*, in doses of two to five grains, prescribed in pills. The use of ferruginous remedies must be persevered in for months. In pills, the iron preparations may also be combined with *extract of nux vomica*, or with *strychnia*, *quinine*, and *aloes*, in suitable doses; or the *syrup of the phosphates of iron*, *quinine*, and *strychnia* may be given, in doses of ten minims, three times daily.

GENERAL DROPSY.

Natural History.—This disease is expressed by an accumulation of serum in the areolar tissue, with or without effusion into the serous cavities—a form of extensive or universal *œdema* or infiltration of the general areolar or connective tissue of the body, to which the name of *anasarca* has been given, from the Greek *ἀνὰ*, "through," and *σὰρξ*, "the flesh." The disease usually begins to manifest itself by *œdema* of the feet and ankles—appearing towards evening, and diminishing, if not disappearing altogether, towards the morning. Such *œdema* is known from its "pitting" under pressure—that is to say, it retains the impression of the thumb and finger when they are made to grasp firmly each side of the ankle over the swollen part. The fluid surrounding the ankle may have gravitated there; but by and by, as the morbid condition persists, which gives rise to the collection of fluid in the connective tissue, the swollen condition extends from the ankles up the limbs, encroaches on the abdominal and thoracic parietes, and lastly, reaches the head and upper extremities. The whole body then exhibits a bloated appearance, sometimes to a very great extent. When effusion actually begins in the feet and ankles, it is usually associated with extreme debility and anæmia. But the *œdema* may be first observed in the face, especially about and underneath the eyes—especially in heart and kidney disease. Where the connective tissue is loose, the local swelling from fluid is generally the greatest; for example, over the dorsum of the foot and back of the hand, eyelids, scrotum of men, and labia pudenda of females.

The lower extremities are often so enormously swollen as to become shining and tense; when the cuticle may rise like a blister; or, giving way, an erysipelatous inflammation may pervade the limb. Sloughs are then apt to form in the connective tissue. Sores form, and become the outlet of excessive discharges of serum, which greatly relieve the patient.

Sometimes, but not always nor necessarily, the anasarca is attended with effusion of fluid into the serous cavities, thereby greatly increasing the danger, and often proving fatal.

The emaciation attending such cases is often extreme; but is only manifest after the *anasarca* has subsided.

The *treatment* of the disease is regulated by the nature of the lesion which causes the dropsical state, and will be considered under "Heart diseases and Kidney diseases." If openings form in the œdematous limbs, or oozing of fluid takes place, much relief is got by placing both feet and legs, up to the knees, each in a pail containing hot bran or hot sawdust. The feet and legs are thus kept warm, and the moisture absorbed.

Beri-Beri.

Natural History.—A disease expressed in the first instance by anæmia, culminating in acute œdema, and marked by stiffness of the limbs, numbness, and sometimes paralysis of the lower extremities; oppressed breathing (anxietas in paroxysms); a swollen and bloated countenance. The urine is secreted in diminished quantity. The œdema is general, not only throughout the connective tissue of the muscles, but the connective tissue of solid and visceral organs in every cavity of the body is bathed in fluid. Effusion of serum into the serous cavities very generally precedes death.

This obscure but very fatal disease is little known to pathologists in this country. Though common in various parts of India, the territorial range of its endemic prevalence seems limited in a peculiar manner to the Malabar coast, to Ceylon, and to that tract of country reaching from Madras as far north as Ganjam. It is principally endemic in that portion of Hindostan called the Northern Circars—a province lying on the west side of the Bay of Bengal, extending from 15° to 20° north latitude. Madras, in north latitude 13° 6′, appears to be the southern limit of the disease in Hindostan. Towards the north of Madras, in the jails of Guntoor, Nellore, Masulipatam, Rajahmundry, Vizagapatam, Chicacole, Bellary, and Cuddapah, the disease is known to prevail. Towards the south it is never seen. It is said to extend from the coast not farther inland than forty to sixty miles. It is regarded by Dr. Paterson of Bahia (where it was very fatal during the year 1872) as an affection of the sympathetic system.

Next to cholera, beri-beri must be regarded as the most fatal disease to which Europeans in India are liable. Mussulmans appear to be more subject to the disease than Hindoos, and the rate of mortality is nearly twice as great among Europeans as it is among the natives.

A residence of several months in a district where beri-beri prevails is necessary to its development; and the greatest predisposition to the disease exists after about eight or ten months' residence in a settlement.

The majority of the phenomena which characterise the well-recorded cases of this disease are undoubtedly referable to *anæmia*. The debility, the cold extremities, palpitation, dyspnœa on exertion, frequent, small, and quick pulse, the bruit occasionally heard in the neck, the scanty urine, the torpid bowels, the deadly pallor of the tongue, all indicate a condition of anæmia. The disease makes its advances in an insidious manner, as all forms of anæmia do, without any primary or well-marked train of symptoms; and the indisposition appears to be comparatively slight which exists as a stage precursory to the visible invasion of the fully expressed disease. The approach of the final and characteristic features of the disease appears to be very gradually brought about.

Treatment.—Judging from the pathology of this disease, the constitutional influence of stimulants, generous diet, and tonics, ought undoubtedly to be the basis of treatment. Should there be irritability of the stomach, effervescing draughts, with doses of *laudanum* and *camphor mixture*, are useful. *Saline drinks* should be administered, and the extremities should be rubbed with stimulating liniments and rolled in flannel bandages. In the *asthenic* or *chronic* form of the disease, the strength must be supported by the most nourishing diet that can be given in small bulk, aided by tonics and wine if necessary; while doses of equal quantities of *squill* and *digitalis* (ten to fifteen drops of each) may be given twice or thrice daily. *Turpentine* is also a useful remedy. A combination of *ergotine*, *iron*, and *extract of belladonna* with *zinc* in the form of pill, accompanied with sea-bathing, was of great service in this disease, as seen in Bahia.

CHAPTER IX.

GENERAL NATURE OF LOCAL DISEASES.

LOCAL DISEASES comprehend all those which affect the structure of special organs or particular parts of the body, leading to marked disturbance of their functions.

Local affections are often accompanied by constitutional symptoms. Such symptoms, when they succeed to and depend upon the existence of the local lesion, are to be regarded as secondary to that lesion.

Many lesions are strictly localised as the results of *constitutional* or *specific* disease; and many such lesions have been already described under the several GENERAL diseases that have been considered in the previous pages of this work. The *local affection* in such cases is often so striking and important that it has especially challenged attention, while the *constitutional state* from which it may have sprung is as yet concealed and unknown. The lesion here is secondary to the general affection. Not a few cutaneous eruptions are of this nature; so also are some forms of dropsy.

The diseases about to be considered are essentially characterised by more or less defined local lesions, with characteristic morbid phenomena, local symptoms, and physical signs.

The elementary form of such lesions has been most fitly considered in the introductory pages, 30 to 77, Part I., of these *Outlines*, and more fully in the 6th edition of the *Science and Practice of Medicine*, p. 23 to 233, by the Author.

CHAPTER X.

DISEASES OF THE NERVOUS SYSTEM.

SECTION I.—PATHOLOGY OF DISEASES OF THE NERVOUS SYSTEM.

It is with nerve-texture and its functions, as composing the essential parts of the nervous system contained within the cranium and spinal canal, and distributed as nerves throughout the body, that we have to deal in describing the local diseases of this section.

The varied phenomena of the nervous system must be examined, having in view—(1.) The purely anatomical structure of the brain and nerves; (2.) the chemical composition and properties of the nervous substance; (3.) the physiological relations of the several parts; (4.) the morbid and pathological relations of the several centres and distribution of the several nerves. Each of these methods of study and investigation mutually illustrate one another; and it is only from a consideration of all of them conjointly that we can arrive at the natural history of a case, and so act for the best in diagnosis, prognosis, and treatment. Every student knows how very many physiological doctrines regarding the brain and nerves receive elucidation from accurately determined anatomical and chemical information, and so tend to explain various points in the pathology of cerebral diseases. He need only be reminded of the phenomena explained by the decussation of the *pyramids* in the *medulla oblongata;* how also the continuity of the fibres of the spinal cord upwards to the *cephalic centres* explains various secondary lesions of the brain as a consequence of lesions in the spinal cord altered by paralysis; and, lastly, the interesting observations regarding the excretion of sulphates and phosphates by the urine in *acute chorea*, *delirium tremens*, and *inflammation of the brain* itself.

Anatomical Constituents of the Brain and Nerves.—The nervous system may be considered as arranged into three great divisions:—(1.) *Brain and Spinal cord*, or *Encephalon*, or *Cerebro-spinal axis*, or *central part of the nervous system*, composed of the *cerebrum*, *cerebellum*, *sensori-motor ganglia*, and *spinal cord;* (2.) the distribution of *nerves*, or nervous texture arranged in the form of long continuous cords or threads, mutually connected, and running in definite directions throughout the body; (3.) an accumulation of peculiar nervous substance, in the form of small, round, and somewhat oval masses, called "*ganglia*," variously connected with each other and with the surrounding parts, and forming what is known as the *Sympathetic system.*

Chemical Composition of Brain and Nerve-Tissue.—The white or grey matter of the brain has been generally taken to represent pure nerve-substance. It consists of albumen, fatty matter, salts, and from $\frac{4}{5}$ to $\frac{7}{8}$ of water. The fatty constituents are remarkable, inasmuch as two of them, being acid compounds, contain a large amount of phosphorus, from 8 to 10 parts in 1,000 of the mass, or $\frac{1}{20}$ to $\frac{1}{30}$ of the whole solid matter. This is continually being metamorphosed during functional and morbid changes of the nerve-substance; and the amount of alkaline phosphates in the urine may be taken in some measure as an estimate of the amount of nerve-tissue disintegrated, the earthy phosphates being disregarded, inasmuch as they have been shewn mainly to depend on the quantity taken in the food. The phosphorus set free by disintegration of the nervous tissue unites, in the form of an acid, with the alkaline basis in the blood, and is thence separated by the kidneys and discharged with the urine.

Weight of the Brain and its Parts.—The absolute weight of the brain or encephalic mass varies in concurrence with variations of age, body-weight, and height of persons; and generally it may be stated to vary within the minima and maxima of 30 to 52 ounces. The bulk of the encephalon varies from 65 to 84 cubic inches. Any considerable change in the specific gravity of the cerebral substance is incompatible with a healthy exercise of the nervous functions. The general results are as follow:—

(1.) The average specific gravity of healthy brain is 1·036. (2.) In paralysis of a chronic character, complicated with insanity, the specific gravity ranges between 1·036 to 1·046. (3.) In some acute cases the specific gravity is as high as 1·052. (4.) In paralysis terminating by coma, 1·040. (5.) In paralysis terminating by syncope or asthenia, 1·036 to 1·039. (6.) In general terms, a higher specific gravity is found when life terminates by coma or asphyxia, than when it ends by syncope or asthenia. (7.) Mean specific gravity of the grey substance of the brain in either sex, 1·034. (8.) In the earlier and later periods of life the specific gravity of the grey matter is below the mean. (9.) The cerebral substance acquires its greatest density in males between the ages of fifteen and thirty, and in females between the ages of twenty and thirty. (10.) The density diminishes with prolonged illness. (11.) It decreases with a lapse of time after death in the ratio of ·001 for every twenty-four hours. (12.) A density of ·006 above the average has been associated with the following conditions during life:—Acute cerebral symptoms, or chronic disease with no cerebral symptoms, or only slight delirium; also with conditions associated with hyperæmia. (13.) Mean specific gravity of white matter, 1·041.

SECTION II.—GUIDES TO THE CLINICAL INVESTIGATION AND DIAGNOSIS OF DISEASES OF THE NERVOUS SYSTEM.

(1.) The "*nervous force*, *nervous power*, or *nervous influence*," which makes itself known by *sensation* and *motion*, also by the various ways in which *mental acts* are expressed, constitutes the primary element of inquiry, as *sensorial*, *motorial*, and *mental* phenomena. Each nerve-fibre in a fasciculus acts quite independently from end to end,—quite isolated from the others in its vicinity; and thus at once we have the enunciation of three distinct sets of phenomena associated with the diseases of the brain and nerves, to be accurately investigated as to—

First, *Phenomena of Isolated Conduction.*—Exalted or diminished action is presented by those nerve-fibres only which are affected by the irritating or depressing cause, and the adjoining fibres, though in ever such close approximation, are not implicated.

Second, *Phenomena of Sympathy or Irradiation of Sensations.*—That irritation is propagated from a fibre originally excited to other centripetal nerves.

Third, *The Phenomena of Intelligence.*—The brain furnishes the conditions necessary for the manifestation of the Intellectual Faculties, properly so called, such as the Emotions, Passions, Volition, and is at the same time essential to Sensation. The evolution of power or nerve-force immediately connected with mind emanates from the hemispherical ganglia; and clinical observation points out that in those cases in which disease has been found to commence at the circumference of the brain, and proceed towards the centre, the mental faculties are affected *first*—*e.g.*, in *meningitis* and the like; whereas in those diseases which commence at the central parts of the organ, and proceed towards the circumference, the mental faculties are affected last—e.g., *tumors* in the central white substance.

(2.) The spinal cord, by its connection with the brain, furnishes the conditions necessary for combined movements; and clinical observation shews that, in cases where the *central portion* of the cord is affected previous to the external portion, the individual retains the sensibility and power of moving the limbs, but wants the power to stand or walk; whereas, when disease commences in the *meninges* of the cord, pain. twitching, convulsions, numbness or paralysis indicate lesion in the white conducting matter.

(3.) The brain alone furnishes conditions necessary for *intelligence;* the spinal cord, conditions essential to *movement;* and together they connect the *balancing and co-ordination of motor and sensific power.*

In dealing with the diseases of the NERVOUS SYSTEM, it is incumbent on the physician to ascertain, as correctly as possible, the *locality of the lesion*, *the nature of the affection*, the *anatomical condition of the part affected*, *the condition of the heart*, and *the state of the urine.* Although it has been sometimes asserted that it is of little practical importance to discriminate accurately between diseases of one part of the brain or of its membranes and those of another, because the treatment may be the same for all, yet, for the sake of science—because "knowledge is power," and because the acquisition of such knowledge must eventually alleviate the sufferings and lessen the sorrows of humanity—the sooner such doctrines are ignored the better for the science of medicine; and, moreover, the majority of the medical profession are beginning to appreciate the principle that diagnosis should be carried as far as possible. (See also p. 13 *ante*, Part I.)

I. *Locality or Seat of Lesion.*—The grounds of diagnosis are—

(*a.*) The *brain* is presumed to be the seat of lesion when several of the special senses are simultaneously affected; when *perception*, *ideation*, *volition*, and *special sensation* are affected; when the muscles and general sensory nerves are implicated longitudinally and unilaterally (hemiplegia); when muscles situated so high as those of the face and tongue are involved, and the *orbicularis* of the eyelids does not share in their affection. In these rare cases of bilateral (or transverse) paralysis *(paraplegia)*, resulting from some cerebral change, the symptoms at some period of the case have generally referred to the head (by their special character), so that, by a combination of the two classes of observations, the general diagnosis may almost universally be established.

(*b.*) The *spinal cord* is presumed to be the organ affected when the symptoms of motory and sensory character are distributed transversely or bilaterally, inducing paraplegia or transverse spasms, the mental functions being unchanged. The precise locality may be estimated sometimes from a knowledge of the anatomy of the spinal nerves. If the lesion or disease is high, speech, deglutition, or respiration may be impaired. There is often erection of the penis (*priapism*), and the retention or involuntary discharge of fæces or urine.

(*c.*) The *nerve-trunks* are presumed to be the seat of lesion when the symptoms are referable to an isolated muscle, or group of muscles, or to a small portion of the sensory surface. When paralysis is the symptom, the irritability of the muscles to electric stimulation is quickly lost, and the symptoms shew no disposition to wander from the special localities affected.

In diagnosing the locality of diseases of the brain generally, it is necessary to distinguish, in the first instance, the *intrinsic diseases* of the nervous system; also local diseases from nervous complications of other diseases not of a local kind. It is necessary also to distinguish affections of the *brain*, *spinal cord*, and *nerves*, as much as possible from each other; and, lastly, to separate diseases of the *meninges* from *cerebral lesions*.

TABLE III.—DISTINGUISHING CHARACTERS OF MENINGEAL FROM CEREBRAL DISEASES.

CEREBRAL DISEASE.	MENINGEAL DISEASE.
1. From the outset, or from a very early stage of development there is loss of some one or more of the proper nervous functions, such as paralysis, anæsthesia, loss of memory.	1. It is not till some time after the detection of signs of disease that diminution or loss of nervous function takes place.
2. Cerebral disease is not commonly attended by high-marked exaggeration of function, such as furious delirium, convulsions, intense hyperæsthesia, pain, or tenderness.	2. The subsequent diminution or loss of nervous function which succeeds the prolonged existence of "head symptoms" is generally preceded, in cases of meningeal disease, by extremely severe excitement or exaggeration of functions, such as pain, tenderness, furious delirium, or convulsions.
3. Little vascular excitement attends cerebral disease, nor is there frequently any highly marked general disturbance.	3. In meningeal affections there is usually much local vascular excitement, with general disturbance.
4. Paralysis and anæsthesia, losses of volition, ideation, perception, and the like, characterise cerebral disease.	4. Spasms, convulsions, pain, and delirium are the general features of meningeal disease.

It is chiefly by the history of the case that nervous symptoms peculiar to the *Specific* or *Constitutional* class of diseases are to be distinguished. It is also generally worthy of notice that symptoms referable to altered nervous functions are the earliest indications of intrinsic or local diseases of the organs of the nervous system; and that when general disease exists of a *Specific* or *Constitutional* kind, the nervous symptoms are secondary in relation to the time of their appearance, compared with the earliest manifestation of symptoms of ill-health.

The diagnostic value of *vomiting*, as a symptom of cerebral disease, is one which must be thoroughly appreciated, and never lost sight of. The intimate sympathy subsisting between the stomach and the head is a matter of daily observation. Headache from gastric disturbance is as common as vomiting from cerebral derangement. In children especially, the existence of obstinate but easily accomplished vomiting is indicative of head rather than of stomach disease.

A consideration of the following points (for comparison tabulated) may be useful as shewing that, while vomiting may depend upon derangement in the gastro-intestinal canal, it may also depend upon increased sensory or reflex action, and is thus a valuable indication of cerebral disease.

TABLE IV.—CONTRAST BETWEEN GASTRIC AND CEREBRAL VOMITING.

GASTRIC OR HEPATIC VOMITING.	CEREBRAL VOMITING.
1. There is nausea, which is relieved, at all events temporarily, by the discharge.	1. Little or no nausea, and the vomiting continues, in spite of the complete discharge of its contents by the stomach, so soon as anything (liquid or solid) is introduced.
2. The tongue is foul, the conjunctivæ often yellowish, and the headache secondary in respect of time.	2. The tongue may be clean, the conjunctivæ colourless or injected, and the headache primary.
3. Griping pain in the abdomen, diarrhœa, and disordered evacuations frequently attend the *gastric* or *hepatic vomiting*.	3. Obstinate constipation generally attends *cerebral* vomiting.
4. Retching and increased salivation attend *gastric* or *hepatic vomiting*.	4. In *cerebral* vomiting the stomach is emptied almost without effort and without any increase of the salivary secretion.

A summary of the results of the important experiments of Dr. David Ferrier cannot fail to aid the exact localisation and diagnosis of cerebral disease. They also explain many hitherto obscure symptoms; and some of the conclusions are in opposition to commonly received views.

(1.) The anterior portions of the cerebral hemispheres are the chief centres of voluntary motion and of the active outward manifestation of intelligence. (2.) Individual convolutions are separate and distinct centres; and in certain groups of convolutions are localised the centres for various movements—*e. g.*, eyelids, face, mouth, tongue, ear, neck, hand, foot (and tail of animals). (3.) The action of the hemisphere is in general crossed; but certain movements of the mouth, tongue, and neck are bilaterally co-ordinated from each cerebral hemisphere. (4.) The *corpora striata* have crossed action, and are motor centres for the muscles of the opposite side of the body. Powerful irritation of one *corpus* causes rigid pleurosthotonos—the flexors predominating over extensors. (5.) The *optic thalamus*, *fornix*, *hippocampus major*, and *convolutions grouped around it*, have no motor signification, and are probably connected with sensation. (6.) The *optic lobes* or *corpora quadrigemina*, besides being concerned with vision and the movements of the iris, are centres for the extensor muscles of the head, trunk, and legs. Irritation of these centres causes rigid opisthotonos and trismus. (7.) The cerebellum is the co-ordinating centre for the muscles of the eyeball. (8.) On the integrity of these centres depends the maintenance of the equilibrium of the body. (See *West Riding Lunatic Asylum Reports*, vol. iii., 1873; also, *Proceedings of the Royal Society*, March 5, 1874.)

II. *Nature of the Affection.*—The nature of the intrinsic diseases of the nervous system may be distinguished by the following clinical phenomena:—

(*a.*) *Acute*, but *non-febrile*, to distinguish them from the nervous symptoms which attend and are peculiar to the febrile state of many of the general diseases. (Sec. A and B, already noticed.) They are of such a kind as are marked by—(1.) Diminution or loss of functional activity (apoplectic and paralytic diseases). The group of symptoms called "*apoplectic*" are, loss of consciousness and of voluntary motion, as if by a sudden "*stroke.*" (2.) Increase or excess of functional activity, such as of sensibility (*neuralgia*), of mobility (*convulsions*, *spasms*), ideation (*delirium*); exalted, perverted, or suspended functional activity, such as in *chorea*, *hysteria*, *catalepsy*, *epilepsy*, some diseases of the intellect.

(*b.*) *Chronic* diseases, the character of chronicity depending not only on the time such diseases last, but also on the severity of their course.

Such chronic diseases are marked by—1. Excessive functional activity, as by *neuralgia*, *hallucination*, *chorea*, *hypochondriasis.* 2. Diminution or loss of functional activity—for example, *anæsthesia*, *paralysis*, *dementia*, *epilepsy.* 3. Combinations of these conditions, such as—(1.) Loss of mobility, with increased sensibility, as in *paralysis with pain*; (2.) loss of mental, with increased motor activity, as in *coma* with *spasms;* (3.) loss of sensibility, with increased mobility, as in *anæsthesia* with *reflex spasms.*

It is of great importance also to recognise clinically the differences between the symptoms of—(1.) Loss of function; and (2.) Irritation.

The most frequent cause of local paralysis or loss of function is an irritation in certain parts of the nervous centres, or in the trunk or periphery of nerves. Such circumstances may produce loss of function (*paralysis*) in very different parts in different cases, according to the particular fibres on which the irritation has acted. Thus there are now numerous cases, capable of clinical recognition, where paralysis of the upper and lower limbs, and of the face, as well as of contractions and rigidity, which are traceable to the influence of reflex action, and due to irritation.

Symptoms of irritation may be arranged in two groups, according as the irritation acts—(*a.*) In the central parts, as in convalescence from such serious illnesses as *enteric fever*—overtaxing the mental powers, as in the case of weak children; or, (*b.*) In the peripheral parts of nerve-fibres, as in the neuralgic headache of dyspeptic children during the second dentition, when the symptoms resemble those of the first stage of *tubercular meningitis.* Convulsions, and even paralysis, are not rarely due to Bright's disease, to the irritation of ascarides, and may occur concomitantly with the second dentition, just as they occur in the first.

III. *Anatomical Morbid Condition.*—Although some of the diseases of the nervous system are marked by excessive severity of symptoms during life, such as *tetanus*, *epilepsy*, *chorea*, *hysteria*, *neuralgia*, and the like, yet no characteristic or constant structural change can be detected in the nervous centres after death, either as a consequence or as a cause of such diseases; and although the belief is daily extending, that no morbid conditions of function can exist without some correspondent change in the organs, yet, so long as we have no means of appreciating such changes, the diseases now noticed must be regarded as "neuroses," "dynamic," or "functional" diseases.

But there are many other diseases of the nervous system which are attended by some physical changes in the organ, expressed by undoubted symptoms during life, and which leave evidence of their existence after death. For example, very different apparent vascularity is discoverable after death in the nervous masses and texture; and there are two very common classes of nervous symptoms during life which evidently depend upon the variable amount of blood in the brain. These symptoms are referable to *active arterial hyperæmia*, and are distinguished by the well-known phrase of "determination of blood to the head;" or they are referable to *passive venous hyperæmia*, commonly called "congestion." The question has been much discussed and experimented on as to whether more than a fixed proportion of blood can find its way into the brain; but all considerations of the subject lead to the conclusion that the quantity of blood within the cranium is extremely variable at different times and under different circumstances; and (as clearly stated by Dr. Sieveking) there is a peculiar property belonging to the white matter of the brain which has a strong bearing on the question—namely, the great elasticity of the medullary tissue, so much so that the resiliency afforded by this property is a sufficient counterpoise to the rigid structures which envelop the brain, and which do not, as is erroneously supposed by some, remove the intracranial contents entirely from the influence of atmospheric pressure. That pressure is exerted on a large surface, composed of columns or tubes of blood in innumerable small curved vessels, which maintain, through the scalp and diploe of the skull, a direct communication with the blood within the cranium; and which is thus directly influenced by atmospheric pressure, while every anatomical arrangement of the parts within the cavity of the skull illustrates provisions made to counterbalance the varying interchange of bulk between the solid and fluid contents of that cavity. Among these may be noticed the ventricular and subarachnoid spaces, with their varying amount of contained serosity, as furnishing most prominent evidence of provision to accommodate the varying amount of fluids within the cranium.

Morbid states of the brain are also due to a poisoned state, or to a state of *hyperpyrexia* of the blood; although such a condition cannot be proved in all cases,—such, for example, as occurs in many of the general diseases already noticed, such as *typhus*, *variola*, *scarlet fever*, *rheumatism*, as well as from the action of *alcohol*, *opium*, and *urea*. It is often of importance to determine whether urea circulating in the blood is contaminating the brain and impairing its functions. The detection of urea in the brain after death, as well as for its discovery in the blood during life, may be done as follows:—

"1. *In the Serum.*—Take the serum from a good-sized blister, and evaporate it to dryness over a water-bath. The residue is to be extracted with alcohol, which is a ready solvent of urea. This alcoholic extract is then to be evaporated to dryness, and a little water added, so as to make a syrupy mass, which should be plunged into a freezing mixture, and a few drops of pure nitric acid added to it. If urea be present, the characteristic crystals of nitrate of urea are soon found in the solution, and may be recognised either by the naked eye or by the microscope.

"2. *In the Substance of the Brain.*—Take about three-fourths of a whole brain, and cut it up into small pieces. Then treat it with four successive portions of boiling distilled water, each portion, consisting of about ten ounces, being allowed to stand six or eight hours before the next is added. The brain, while thus macerating, should be frequently stirred and mashed about with a glass rod. The washings, after being poured off, are to be mixed together and filtered. The filtered aqueous extract so obtained must be evaporated to dryness over a water-bath, and the dry residue, after being powdered, is to be again treated with four successive portions of boiling distilled water, observing the same precautions as before. The washings, after being mixed together are to be filtered, and the clear solution evaporated to dryness over a water-bath; and after being thoroughly dried in a hot-water oven, the residue obtained in this manner should be finely powdered, and the powder boiled in five successive portions of ether. The ethereal extract so obtained should be evaporated to dryness at a low temperature, and then treated with a little tepid water, and allowed to get quite cold. It is then to be filtered through paper previously moistened with water, and the clear solution again evaporated to dryness at a low temperature, when a small quantity of the extract procured in this way (which would contain all the urea present in the brain operated upon) is to be placed on a glass slide, treated with a drop of strong nitric acid, covered with a bit of thin glass, and allowed to stand a little time, and then examined under the microscope. A few crystals will then be seen, having all the characters of those of nitrate of urea."

IV. *Investigation of Special Symptoms:*—namely—*pain* generally, and in the form of *headache* or of *spineache; numbness, neuralgia, tingling, anæsthesia, hyperæsthesia, giddiness* or *dizziness, hallucinations* or *delusions, delirium; impaired, double,* or *distorted vision; strabismus, convulsions, spasms, coma, stupor, dilatation* or *contraction of the pupil, paralysis, tremor; deafness,* or *tinnitus aurium; slow, hesitating, imperfect speech, perversion of smell or taste, loss of memory, sleeplessness, impairment of mental faculties.* These special symptoms should be classified in each case into *mental, motorial,* and *sensorial.*

Headache, cephalalgia, or *pain in the head,* with or without giddiness, although frequently attending diseases of the nervous system, are yet very uncertain signs, because they are associated with so many other disorders—such as gastric derangement, constipation, and dyspepsia. But the conditions attend active cerebral congestion, cerebral meningitis, encephalitis, the specific febrile diseases, syphilitic periostitis, and intracranial tumors. *Sick headache* is attended with nausea and vomiting; *nervous headache* is not so attended.

Pain, tenderness, uneasy sensations, burning, throbbing, are each and all important indications of nervous ailments. It is important to determine the localisation of pain, or of any special sensation which attracts the patient's attention; also the duration of the sensation, as to its constant or paroxysmal character; the influence of pressure on the part. or of movements, as of walking. If connected with the spinal column, as *spineache* in any form, the effects of percussion over each individual spinous process must be observed, and of concussion of the heels; also of kneading or firm pressure over the spinous processes, and the passage of an ice-cold or a very hot sponge. The pain of inflammation must be distinguished from the pain of neuralgia.

Vertigo or *dizziness* is a vivid representation of movement either of the body of the patient himself or of surrounding objects which are actually at rest. It is generally attended with nausea and sometimes by vomiting. The attacks are usually incident to some form of dyspepsia, digestive derangement, bad food or irregular feeding, excessive mental work with close confinement; exposure of head to the sun, excitement, anxiety, and worry. It is a familiar instance of a simple *hallucination* or *delusion;* but it may nevertheless be associated with grave disease, such as degenerative changes in the cerebral vessels, renal disease, gout, a weak or fatty heart affecting the flow of blood to the head. Movements which affect the circulation also give rise to this symptom, such as waltzing, swinging, sailing, and riding, especially on a camel's back.

Delusions imply a belief in the existence of things which have no existence in reality; or an erroneous perception of the nature of things, or of their relation to each other, occasioned by cerebro-mental disease —intellectual errors caused by the pathological condition of the mind, and expressing itself in false Sensation, Perception or Conception.

Delirium embraces wanderings of the mind, which cannot be fixed, and varies from mere confusion of thought to fixed delusion. It is shewn by incoherence of expression especially, and is generally combined with some degree of unconsciousness. Its relation to coma must be carefully inquired into. There is generally restlessness, prompting the patient to get out of bed. This symptom is most expressed at night. The conditions under which it occurs must be constantly kept in view. They are—(1.) During the natural course of the specific general diseases of Section A. (2.) Alcoholic poisoning, to which the name of *delirium tremens* is given. (3.) Alterations of the blood during acute inflammations, as in *pneumonia* and *acute hepatitis*, *carditis*, *erysipelas*. (4.) In the course of acute constitutional diseases—*e. g.*, *gout* and *rheumatism*. (5.) In connection with such cerebral diseases as headache attends, *tubercular meningitis*, especially in youth and adult age; and generally in inflammatory affections of the *meninges* of the brain; *acute mania*. (6.) As a consequence of nervous exhaustion from mental overwork.

Sleeplessness is of importance chiefly as associated or not with delirium, if it has gone before it or not, and if it persists. The account given by a patient as to sleeplessness is often incorrect, and cannot be relied on.

Coma, *unconsciousness*, *insensibility*, *stupor*, are names significant of that condition where consciousness is more or less entirely suspended, with the appearance of profound sleep, from which the patient may sometimes be partially roused. It varies in intensity from profound coma or complete unconsciousness to partial coma or stupor. A history may be obtained as to whether the condition is of sudden onset, with or without convulsions, or has come on gradually with increasing stupor and somnolence; and whether there is any obvious cause. It is necessary to keep in view the causes or conditions under which coma may occur. They are (1.) *Injury to the brain*, such as by compression or concussion. Evidence of fracture of the skull is to be looked for; and the ears, orbits, nasal passages, and mouth cavity must be very carefully examined—especially for evidence of any foreign body hidden in them, by which injury to the brain or its membranes has been brought about. If *hemiplegia* is present, extravasation of blood exists, and the coma will then be most profound. If such *coma* comes on suddenly, without any injury and without convulsions, or very slight convulsive movements, the condition is due to apoplexy. (2.) *Blood-poisoning*, such as from *alcohol*, *opium*, *codeia*, *conium*, or other narcotics; or from such morbid poisons as occur in certain diseases, such as the *uræmia* of Bright's disease. The odour of the breath and of the patient is of much importance; also the degree of *unconsciousness*, and its mode of coming on. It commences very insidiously in cases of general ill-health, when it generally points to albuminous urine, with urea in the blood. (3.) *Effusion of serum into the ventricles* causes coma, which is generally preceded by convulsive spasmodic movements; and the cóma is more or less incomplete. (4.) *Tumors*, *brain softening*, *embolism*.

Convulsions are expressed by the occurrence of universal involuntary muscular contractions, generally of paroxysmal or of temporary duration. *Spasms* are involuntary convulsive actions of less extent. They are *clonic* when they occur in rapidly alternating contraction and relaxation, as in *subsultus tendinum*; they are *tonic spasms* or *spastic contractions* when the contractions have a certain appreciable duration, attended with rigidity or hardness of the muscles, as in *common cramps* and *tetanus*. The proximate cause of the different convulsive movements in epilepsies are caused by irritation or (according to Drs. Ferrier and Hughlings Jackson) "discharging lesions" of the grey matter of the hemispheres in the region of the *corpus striatum*. The affection may be limited artificially to one muscle or group of muscles, or may be made to involve all the muscles represented in the cerebral hemispheres, with foaming at the mouth, biting of the tongue, and loss of consciousness. When induced artificially in animals, the affection, as a rule, first invades the muscles most in voluntary use. *Chorea* is of the same nature as epilepsy, dependent on momentary and successive discharging lesions of the individual cerebral centres. Nystagmus or oscillation of the eyeballs is an epileptiform affection of the cerebellar occipito-motorial centres. The causes of convulsions are to be sought for either in (1.) morbid conditions directly affecting the brain, such as injury or disease affecting the grey matter; circulation of morbid or hyperpyrexial blood, as in the course of the general diseases of Sections A and B; or (2.) to causes which are reflex or sympathetic, such as digestive derangement, irritation from intestinal worms, dentition, passage of renal or biliary calculi, painful injuries of the skin, such as burns, blisters, sinapisms.

V. The investigation of certain *Physical Conditions* materially helps the diagnosis of diseases of the nervous system. The physical conditions to be particularly inquired into are—(1.) Perversion of the sense of touch and power of discrimination. (2.) Perversion of muscular power. (3.) Perversion of body-heat. (4.) Perversion of the powers of expressing thought (*Aphasia*). (5.) Perversion of the Functions of Special Sense, namely:—1. *Vision.* 2. *Hearing.* 3. *Taste* and *Smell.* 4. The *Muscular Sense.* Of these in their order:—

(1.) *The physical diagnosis of perversion of the sense of touch* and power of contactile discrimination is based on the fact, that "if two points of a hard substance touch an unmoved cutaneous surface, they can only be perceived separately when the distance between them exceeds a certain limit." The minimum of distance thus established varies in different parts of the skin. A pair of compasses, the points of which are armed with suitable pieces of cork, may be used to find out the shortest distance at which the points are recognised as separate. A shorter distance than this will give rise to an indistinct impression of a long drawn point; and, finally, on approximating the points still more closely, the perception of the two points becomes completely the perception of one point only.

Several instruments of this kind (*Æsthesiometer*) have been devised suitable for such physical diagnosis of contactile sensibility. Applied in paralysis to ascertain the amount and extent of sensational impairment, the Æsthesiometer affords a means of diagnosis between actual *paralysis of sensation* and mere *subjective anæsthesia*, in which the tactile powers are unaltered; and of determining whether a case of palsy is progressing for better or for worse.

The best instrument is said to be that of Dr. Jaccoud, made by Colin & Robert, of Paris, about nine centimetres long, with a movable scale in the form of an arc of a circle, the whole folding up so as to be easily carried in the pocket.

As it is necessary to know the normal distance limits, Weber's results may be stated as a standard for comparison,—premising that a delicate skin and an active mind admit of shorter distances than are here given.

"(1.) The point of the tongue has the most delicate sense of touch. Here the minimum distance is ·0433 inch. The skin of the middle of the back gives a minimum distance of 2·13 to 2·68 inches, and is the region where touch is dullest. Hence the extremes may differ from fifty to sixty-fold. (2.) Assuming that the average for the tongue is = 1, the distance for the terminal phalanx of the index finger is 1·2, and for that of each of the remaining fingers 1·8. At the thumb side of the first and second phalanges, it is 3·3; and on the dorsal surface of the last phalanx, 4·4. (3.) The red part of the lips gives 3·1, and the white 4·6. This difference is chiefly due to the unequal thickness of their coverings, and perhaps to their nervous relations. The remainder of the face has a still duller sense of touch. On the outer surface of the eyelids it is 7·9; on the skin of the cheeks, 9·4 to 10·9; and in the inferior frontal region, 12·4. (4.) The tactile sensibility of the foot is in every respect inferior to that of the hand. For example, the volar side of the terminal phalanx of the thumb gives 1·5; and that of the great toe, 6·7. The dorsal surface of the hand gives from 4·4 to 14·4; and that of the foot, 12·2 to 25·9. (5.) The extremities of the limbs, such as the hand and foot, have a more delicate sense of touch than their middle segments, such as the forearm and leg; while these again are more sensible than the segments connected with the trunk, such as the thigh and upper arm. The two latter belong to those parts which do not possess a high development of tactile capacity. The vicinity of the elbow and the knee-joint is more sensitive, being easily excited to pain. (6.) The face has a more accurate sense of touch than the crown of the head or the neck. The dorsal surface of the trunk is inferior to the abdominal in this respect. (7.) The friction of some parts of the skin gives rise to peculiar feelings of tickling, or to voluptuous sensations. But such parts do not necessarily rank high in the scale of tactile sensibility. Thus the axilla gives 26·9, and the foreskin 10·6 as the minimum of distance. (8.) The tactile sensibility is capable of being increased by habit to an extraordinary degree. In this way some blind persons are able to recognise different colours by inappreciable differences in their grain. The Bengalese spinning women can distinguish the threads of the cocoon with a tactile delicacy which is almost incredible. And persons devoid of arms may educate the sensibility of the toes, until it corresponds with that of the fingers of an ordinary individual. (9.) In judging of the delicacy of touch, we usually take the minimum distance at which two points can be recognised as the unit from which to start. This fact explains a peculiar illusion, to which attention was first drawn by Weber. When we draw the protected points of the compasses downwards from the cheek to the lips, it seems as if the distance between them gradually increased in consequence of our thus proceeding from a less sensible part to one which is more so."

The following are the rules laid down by Dr. Brown-Sèquard for the use of the *Æsthesiometer:—*

(1.) Fix the two points of the instrument at the distance which is normal to the part of the skin to be inquired into. (2.) Cover the points of the instrument by pieces of cork, as the slightest *prick producing pain* interferes with the perception of tactile sensation. (3.) The points must be applied simultaneously. If the patient feels only one point, when both points touch the skin at the same time, the two points must be gradually separated from each other, and reapplied to the part until both points are felt. This arrangement will indicate the extent of the anæsthesia. If, on the other hand, the two points are each distinctly felt at the normal distance limit, they are to be gradually brought nearer to each other till one point only is felt. This arrangement indicates the extent of hyperæsthesia. (4.) The patient ought not to be allowed *to see* whether one or both points of the instrument are applied, nor should he be made cognisant of the object of the experiment. (5.) The instrument should first be applied upon a healthy portion of skin, so as to ascertain how far he can discriminate the sensation of one or of two points. (6.) If the patient *knows* that both points are in contact he may *imagine* he feels both, no matter how short the distance may be between the points. In such cases one point only should be applied; and after he has asserted that he feels both, let him see that one only has been used: otherwise preconceived notions will destroy the value of the experiment. (7.) In anæsthesia of considerable extent, the two points of the instrument may be applied one after the other after an interval of forty or fifty seconds, and yet give the sensation of only one point: this is due to the slowness of the transmission of the impression; and the æsthesiometer in this way may mark the rapidity of the transmission of tactile impressions. (8.) When the degree of anæsthesia is great, the two points of the *æsthesiometer* are felt only as one, no matter how great the distance between them, provided that they are applied upon the same longitudinal line. Brown-Sèquard has known one point to be put upon the wrist and the other upon the forearm, and yet there was the sensation of one point only. (9.) Cutaneous hyperæsthesia may be of such an amount that, however close the two points may be, both continue to be felt. In a case of *chronic spinal meningitis*, tactile sensibility was so much heightened that the patient felt both points applied to the thigh at the distance of one millimetre apart; whilst, in health, there should have been a space of from five to six millimetres between them for both to have been distinctly felt. (10.) To avoid the mistake of finding either *anæsthesia*, or *hyperæsthesia*, when there is really neither, it should be borne in mind that *strychnia* increases tactile sensibility, whilst *belladonna* lessens it. If then it is necessary to find out the exact state of the cutaneous sensibility of any one part of the body in patients using either of these drugs, the state of tactile sensibility in the healthy parts should be first explored, and the actual normal type of the individual under the influence of these drugs be ascertained. (11.) In certain cases when two points of an *æsthesiometer* are applied, there is a distinct sensation of three points; or two points may be felt when one only is applied. In the instances in which this perversion of contactile discrimination has been met with, there has always been inflammation or congestion, sometimes the result of an intracranial tumor at the base of the brain, and especially in one of the cerebral peduncles, or in one of the lateral halves of the annular protuberance. The sites of this phenomenon are the face, neck, and the hand, but particularly the face, for, in nine cases in which it was observed, in six it was limited to the face. When the distance between the two points of the instrument was two centimetres, two, or sometimes only one, point was felt; but at two and a half, or three, and even at four centimetres, there was a distinct sensation of three points touching the skin.

(*b.*) *Perversion of Muscular Power.*—"Muscle is the instrument, and not the producer, of force; the genetic factor of all muscular power being in the nervous system. Hence damage to the nervous centres is followed by derangement of muscular function, expressed by (1.) muscular irritability, such as *spasms*, *cramp*, *grinding of the teeth*, *convulsions*, *squinting;* (2.) muscular weakness, expressed by *tremors*, local or general; (3.) loss of co-ordinating power; (4.) *reflex* irritability, excessive or deficient; (5.) diminished or total loss of power (paralysis). These are some of the most common consequences of cerebral and spinal disease. Clinically, it is necessary to determine—(1.) If the condition is due to inflammation, or some specific lesion in the tract of a nerve, within the cranium or within the spinal canal. (2.) What is the nature and extent of the lesion? (3.) Is it due to blood-poisoning, *lead*, *arsenic*, *copper*, *mercury*, or poison from food? (4.) Is it functional or reflex? (5.) The state of the system as to nutrition, debility, anæmia, or as to the history and existence of any specific or constitutional disease or family tendency.

The use of electricity is of importance, both as a means of diagnosis and as a curative agent. It is employed in the forms of—(1.) *Frictional*, *static* or *Franklinic electricity*—a form now very rarely used, on account of the clumsiness of the apparatus, the variable influence of the weather on the action of the machine, our inability to regulate the dose, and the impossibility of localising its action; (2.) *Galvanisation* from batteries furnishing a continuous or interrupted galvanic current; (3.) *Faradisation*, as when the *induced magneto-electric* or *Faradic* current from an *electro-magnetic* or *electro-galvanic* battery of sufficient power is passed through a healthy muscle, contractions are excited, shewing that it is susceptible to the electric current, and possesses *electro-muscular contractility* or *irritability;* and a very weak current is sufficient to indicate this readiness to contract. This current also causes more or less pain of a peculiar kind, not due to the contraction merely; and hence it indicates *electro-muscular sensibility*.

In *muscular paralysis*, depending on *intracranial* causes, the paralysed muscles respond more, rather than less, to the electric current, up to the time when they begin to degenerate—*electro-muscular contractility* being in excess. In such cases there is generally early rigidity of the muscles and an irritative lesion of the brain. In another class of cases excitability is diminished, the muscles are flaccid, and the nervous excitability is depressed. In another class of cases there is no difference in the two sides.

In *muscular paralysis* due to peripheral causes, such as injury to nerves or traumatic causes affecting the muscles, *electro-muscular contractility* (Faradic excitability) is *impaired* or *lost*, irrespective of degeneration, while their galvanic excitability may be preserved, or even increased.

In *paralysis* from lead, *electro-muscular contractility* and *sensibility* are both impaired—Faradic excitability being always much diminished and often entirely lost, not only where atrophy has come on, but where the bulk of the muscles is only slightly diminished. In *progressive locomotor ataxy*, muscular response is generally quite normal, although the bulk of the muscles may have decreased. In paralysis from disease of the *antero-lateral* columns of the spinal cord, *electro-muscular* contractility is either diminished or gone. In *hysterical paralysis* the electric excitability of the muscles is normal, while *electro-muscular* sensibility is nearly or totally gone. In *rheumatic paralysis*, *electro-muscular* contractility is normal, while sensibility is stronger in the suffering muscles than in the healthy parts. In *progressive muscular* atrophy *Faradic* excitability is lessened as the bulk of the muscles are diminished. The electric appliances are also of great value in detecting *malingering*—as after injury or railway accidents, when paralysis of certain parts may be pretended to exist. Faradisation will at once decide the presence or absence of peripheral paralysis.

The usual plan of making the patient grasp the physician's hand gives an imperfect indication of impairment of muscular power, nor does it allow of any correct estimation of changes for better or for worse in the progress of palsy. To measure the strength of paralysed muscles of the upper extremity, the *dynamometer* of Mathieu, a surgical cutler of Paris, will be found a useful instrument. It consists of an elliptical steel spring, to which is attached a semicircle of gilt brass, upon which a scale is marked. An indicator, with a small cog-wheel at one end, may be moved freely around the arc of the circle by a steel arm, upon one side of which cogs are cut, fitting into those of the indicator. The lower end of this arm touches the elliptical spring, when the indicator points to zero on the scale; a brass sheath on the under side of the scale keeps this arm in place, at the same time letting it move freely.

It may also be used to measure tractile force; and it has been found useful in determining the effect of electricity upon the irritability of paralysed muscles, and so enabling the physician to decide whether the strength of the muscles is increased or diminished after the application of this agent.

(*c.*) *Perversion of Body-heat.*—In cases of hemiplegia the temperature of the paralysed side is raised by half a degree to one degree. It is rarely normal and never lessened. The thermometric equilibrium is restored on the cure of the paralysis. The general body heat of hemiplegic patients is not as a rule increased, and is usually below the normal—92·5° Fahr. During the last hours of life it may rise to 96° Fahr. Well-marked paralytic atrophy is attended by lowering of temperature in the parts affected. Becquerel's discs, in connection with a galvanometer, are the best means to determine differences of body temperature in paralytic parts. They are composed of two thin plates of *copper*, soldered to a thin rod of *bismuth*, contained in a small tube of hard rubber, furnished with a handle. One disc is placed on the sound limb, and the other on the corresponding part of the paralysed limb. Both are in connection, by means of delicate silk-covered wires, with the poles of a galvanometer. If the temperature of both limbs be the same, the needle of the galvanometer remains at rest. If the heat of either limb is raised, the needle is deflected to the north or south pole, according as one or other limb has the highest temperature. A difference of less than $\frac{1}{100}$ of a degree can thus be determined.

(*d.*) *Perversion of the Powers of Expressing Thought.*—This physical sign of cerebral disease has been elevated by some writers into a substantive affection under the name of *Aphasia.* It implies an inability to communicate thoughts, ideas, or names of things either by words or by writing, the intellect being more or less perfect otherwise, and the organs of phonation free of paralysis. Every shade of deficiency or inability characteristic of this affection is to be met with, from temporary loss of memory of certain words, the names of common objects, and their misuse in conversation, up to persistent and complete inability to give expression by words, writing, signs, or gestures, to thoughts or ideas. "In some cases a mere inability to articulate, whilst the patient is able to write; in others a loss of memory of words until they are suggested; and in yet others a total forgetfulness of names—the patient giving everything a wrong appellation" (WILKS). The non-expression of the names of things, or the substitution of wrong ones, is among the most common forms of this inability. "Hand me the —— to stir the ——." "Poker" and "fire" are the words which are incapable of being spoken. "Give me my ——; you know," pointing to his head. "Your hat?" "Yes, my hat." Many other examples are given by Trousseau. The substitution of one word for another is another form of this affection—*e.g.*, "boots" for "head." Forgetting your own name, or the name of the person you go to visit, is another form. In another series of cases there is a sudden loss of the general faculty of speech, without paralysis or incapacity of thought. In a third set of cases there is unilateral palsy or unilateral spasms; and sometimes it occurs after an attack of apoplexy, or after an attack of severe typhus or typhoid fever.

In some cases, however, the thought or idea which leads to verbal expression, as Dr. Gairdner shews, is not absent, so that the faculty remains of communicating by the usual written signs.

The several theories of localisation of the brain lesion believed to be present in cases of aphasia are not capable yet of positive demonstration. The disorder may exist in any of the typical forms, and yet no appreciable change be detected in any part of the cerebral substance or its blood-vessels. The following are the general results of *clinical* and *post-mortem* investigation:—(1.) In a large majority of cases of *aphasia* the peculiar inability of speech is associated with unilateral palsy, indicating disease of the *central ganglia*, or immediate surroundings of the *corpora striata*. (2.) In numerous cases, but not in all, there is disease of the third left frontal convolution of the cerebrum, or in the left anterior lobe, very near to this convolution. (3.) The whole of this convolution and the left anterior lobe of the brain may be wholly or partially destroyed, and yet no loss of speech has been observed. (4.) Aphasia may exist with apparent integrity of the left anterior lobe of the cerebrum, and indeed of the whole brain. (5.) In all the cases Dr. Wilks has seen there has been disease in the *central ganglia*—a necessary lesion for the production of *hemiplegia*—and loss of speech seems to accompany, and is usually found in connection with *right* hemiplegia, when a small spot of disease in the left *central ganglia* is sufficient. It may also occur from disease of the *pons Varolii* (*Guy's Hosp. Reports*, vol. xii., p. 174; also *Medical Times*, 1868).

As a separate and distinct disease due to specific lesion, *aphasia* cannot yet find a place in nosology. The phenomena are complex in the extreme; and the connecting link between the mental defect and loss of speech, with material change in the brain, is both clinically and anatomically still incomplete. Mental co-operation is defective in all the cases.

(*e.*) *Perversion of the Functions of Special Sense:—*

1. The eye furnishes important *indicia* of cerebral disease, and must be examined (1.) by comparing and observing the state of the pupils; (2.) by ascertaining the extent of the field of vision in both eyes; and (3.) by the ophthalmoscope.

Since the ophthalmoscope has enabled us to look into the interior and very innermost depths of the eye, it is found that visible indications of disorders of the nervous system may be seen in its structures. Hence the great importance to the physician of examining the eye by the ophthalmoscope in all constitutional diseases, as well as in those of the nervous system. Certain changes in the eye are known to accompany certain diseases of the brain and spinal cord, and also certain lesions of organs more remote, which are the expression of *general* and *constitutional disease*. Although the diseases of the eye form now almost a distinct speciality, and are claimed by the ophthalmic surgeon, nevertheless pathology recognises no such artificial distinctions. The student of medicine must study diseases of the eye with the aid of the ophthalmoscope as a general practitioner of the healing art; and physicians are learning every day to appreciate the advantages of this instrument as a valuable aid to diagnosis and prognosis, especially in cerebral affections, and the medical schools have recognised the necessity of teaching its use. The innermost depths of the eye of patients suffering from any acute or chronic affection of the nervous system ought to be examined, whether they complain of defect of sight or not; and practical experience in the use of the ophthalmoscope is absolutely essential.

One of the first and most important observations, in a pathological point of view, is the recognition of the *close relations which exist between the cerebral and intra-ocular circulation*, and especially the changes in the *optic disc*, the *retina*, and the *choroid*, happening in the course of cerebro-spinal disease.

The *optic disc* may be *seen* to be the seat of simple congestion, and of congestion with effusion within or around it, of inflammation of its sheath, of inflammation in its substance, of anæmia, and lastly, of atrophy. The circulation of the optic nerve is thus judged of from the condition of its disc and of the retina, so that any change of vascularity evident in those parts of the *fundus* of the eye may be, to some extent, an index of changes in the cerebral circulation. The circulation in the optic nerve is essentially part of the cerebral circulation. The *optic tract*, *chiasma*, and *nerve* receive their blood-supply chiefly from the *choroid plexus* and *pia mater;* the *optic tract* generally receives also a branch from the middle cerebral artery, and close to the sclerotic the *optic nerve* receives the short *ciliary arteries* given off from the *ophthalmic* soon after the *arteria centralis retina.* Thus the blood-supply influences the appearance of lesions as they proceed from *optic disc* or *retina.*

The *retina* may be *seen* to be the seat of fibrous and fatty exudations or patches, more especially in the course of the vessel, also of hæmorrhages. The *choroid* may be *seen* to be the seat of disturbance, or loss of its pigment, and of hæmorrhages.

The affections of the nerve-vascular parts of the eye may thus denote—

(1.) Simple hyperæmia of the discs and retinal blood-vessels; (2.) Anæmia of the same parts; (3.) Ischæmia of the discs and its consequences; (4.) Acute interstitial neuritis and consecutive atrophy; (5.) Neuro-retinitis; (6.) Peri-neuritis, chronic neuritis; (7.) Primary or simple progressive atrophy.

The blood-vessels within the eye may be *seen* to undergo many characteristic changes, such as diminutions or obliterations, dilatations, tortuosities, pulsations, varicosities, blood stasis, embolism, thrombosis, or rupture. Examples and descriptions of these various morbid lesions are to be seen in the valuable *Atlas* of Liebreich and in the chromolithographs of Bader, Galezowski, and Bouchut. In severe congestions within the eye there is generally a decided difference between the conditions of the two eyes. The *papilla* is scarcely distinguishable in colour from the *retina*, and perhaps is to be traced only by the convergence of the vessels. The veins tend to become swollen and tortuous, sometimes varicose. When the centre of the disc remains white, this form of congestion has been named *peri-papillary*, and is often seen to be confined wholly or partially to one part of the circumference of the *disc* with the corresponding district of the *retina.* The retardation of blood in the veins produces in them every degree of change, from simple dilatation to varicosity, elongation, and even rupture; and ruptures are most frequent in cases of *albuminuria.* The effused blood degenerates more or less quickly, so that these hæmorrhages appear also as whitish blotches or streaks in the course of the vessels, and are very characteristic of that state of the system in which the small rough kidney is found.

Simple *hyperæmia* may be due to orbital disease, to *choroiditis*, or to Bright's degeneration and *alcoholismus;* but in by far the greater number of cases it is due to encephalitic disease—to tumors, acute or chronic meningitis, or to changes in cerebral vascularity, attended with convulsions.

The lesions which attract most attention in *the Optic Disc*, as connected with central disease, are—(1.) *Optic neuritis*, with its *consecutive atrophy;* and (2.) *primary* or *progressive atrophy.*

Optic neuritis is very generally co-existent with *meningitis* of the base of the brain, with *tumors* and with large *hæmorrhages;* and hence it is a valuable symptom. It is to be distinguished, however, as such, from the *retino-neuritis* of albuminuric patients, and from the *retino-choroiditis* of syphilis, mainly by the history of the case, and the limitation of the affection, for the most part, to the papilla and converging vessels. It is a condition marked by serous infiltration and prominence of the papilla, and is most commonly due to extra-ocular causes, whether orbital or cerebral (Gräfe). The disc becomes larger than usual, its edges indistinct, irregular, and puffy; the infiltration casting a veil over it so as to change its colour into a lilac-grey, and more or less to conceal the vessels as they pass within its margin. The veins increase in size, become tortuous, or even varicose; they darken in colour, and are seen to be gorged with blood; the capillaries also, which, in their normal state, ought not to be seen, become evident, and give a mossy or woolly appearance to the disc. The walls of the vessels are mostly healthy, so that the extravasations of blood, often seen in albuminuric cases, do not generally occur in *optic neuritis.* The lesion is generally seen in both eyes, unless it depend upon orbital disease. The pupils are generally dilated; in simple atrophy they are for the most part contracted.

During the congestive stage of *optic neuritis*, the *optic nerve* for more or less of its length is of diminished consistence, and of a red or yellowish-grey colour. The sheath is thickened by the inflammatory process; and the contents of the sheath may be pultaceous, when the softening generally extends to the *chiasma*, or far beyond the *tracts*, and even as far as the *central peduncles*, *corpora geniculata* and *quadrigemina.* The next stage in the process of *optic neuritis* is the commencement of the *consecutive atrophy.* The intense vascularity in and about the disc subsides—the infiltrations are absorbed—the nerve whitens, and the capillaries slowly shrivel and vanish. The edges of the disc become distinct, but are deformed; and patches of organised lymph are to be seen upon and about them. Nevertheless vision is very little interfered with; and therefore this disorder of the eye is apt to be overlooked; and sometimes when patients were more or less blind in the acute stage, sight has been recovered to some degree in the subsequent stage, when the consecutive atrophy commences. Tumefaction disappears in the injured nerve, the nerve-fibres are mostly broken up, and there is considerable hypertrophy of the connective tissue. The nutrition of the nerve has been interfered with, but the nerve, though crushed, may not be quite killed; and if relieved from congestion, it has a chance of recovery.

In *optic neuritis*, "the neurilemma is first involved in the *neuritis*, and its nuclei proliferate. Into its meshes the effusions, solid or fluid, of inflammation take place; and it is owing to the continuity of their structure that the inflammatory process travels from one end of the nerve to the other. Thus, also, the nerve tubules are subjected to pressure, and their function is suspended." Some, however, do not consider that the structure of the nerve is *primarily* in fault, but conclude that *optic neuritis* depends not at all upon the nature of the intracranial disease, but upon the amount of resistance which it offers to the circulation—that meningitis does not disturb the optic nerve by exciting inflammation in the course of the *neurilemma*, but by throwing up a dam in the way of the venous blood. The *choroido-retinal* branches of the ophthalmic vein convey the blood to the *cavernous sinus*, and thence into the *petrous* or lateral sinus, to gain the jugular vein. But there are lesions which act as obstacles to the flow, and tend to dam up the blood in the sinuses for more or less of their extent. Such obstacles frequently occur from inflammation of the brain or of its membranes, tumors, phlebitis, hæmorrhages, chronic hydrocephalus, cerebral congestions, and which, sooner or later, by obstruction to the circulation, cause degenerations of the *retina* and *choroid*, and atrophy of the *optic nerve* and *disc*.

Simple primary or *progressive atrophy* of the *optic disc* is the most hopeless of lesions. It is a process of degeneration from within, mostly ending in utter blindness. It must be distinguished from atrophy with *glaucomatous excavation* or *posterior staphyloma*, and from the changes in the disc which may accompany pigmentary retinitis and choroiditis.

The appearance of *progressive atrophy* is characteristic. The fine capillaries which give the rosy tint of the healthy disc slowly wane, and a dead white or pearl-like white is left. Vision is lost, passing steadily and surely away. The border of the disc is sharp, clearly defined, flat and even, and it strongly contrasts, by its whiteness and definition, with the red tissues surrounding it. The lesion depends nearly always on some disease of the cerebrum, cerebellum, or spinal cord. In many the atrophy is of a mixed kind, and there may be slight effusion. *Hemiopia* (lateral) is always due to cerebral disease.

The *optic nerves* are almost always involved in the process of *meningitis* at the base, and in *tuberculous meningitis*, *optic neuritis* almost always exists. Not so meningitis confined to the *fissure of Sylvius*, or upon the convex surface of the brain.

In the first period of *meningitis*, dilatation of the veins of the *retina*, peri-papillary congestion, and often effusion are common. In the second period, tortuous veins, stasis, thrombosis, and even rupture of the vessels—lesions which appear more or less quickly, according to the amount of obstruction to the circulation in the sinuses occasioned by the meningitis. It always tends mechanically to oppress the venous circulation. Lesions in the back of the eye are also to be seen in Bright's disease and syphilis.

In *Bright's disease* the nutrition of the *optic nerve* as well as of the *retina* is profoundly altered; and atrophic changes of the nerves have been found, even at the corpora quadrigemina, with fatty patches in and about the *chiasma.* Upon the *retina*, extravasations are found in the course of the vessels. These extravasations are slowly effused, and pass into degenerative states, forming white patches or striations along the margins of the veins, while other patches may be due to degeneration of the retina itself. These *retinal* degenerations are the first in order in *Bright's disease;* while in *cerebral disease* the *optic disc* is generally the first part to shew signs of change.

In *syphilis* the *choroid* is the chief seat of lesion; and patches of many colours are to be seen at the back of the eye, some of a brilliant white, others of darker tints, such as red or brown.

The most important indications of cerebro-spinal organic lesions capable of recognition by ophthalmoscopic examination of the eye, have been summed up as follows by Drs. E. Bouchut and Clymer, as significant of general diseases:—

(1.) *Optic neuritis* and *neuro-retinitis*, *choroiditis*, and *papillary atrophy* accompany the greater number of acute and chronic affections of the brain or spinal cord.

(2.) The law of coincidence of *optic neuritis* and organic lesions of the nervous system may be explained by the anatomical and physiological relations of the eye with the brain and spinal cord.

(3.) Whenever any positive hindrance occurs in the cerebral circulation, in consequence of a lesion of the brain or spinal cord, there is *papillary* and *retinal hyperœmia.*

(4.) When there is acute or chronic inflammation of the brain, it may extend to the eye by following directly the course of the optic nerve.

(5.) Affections of the anterior spinal cord may, on account of the anastomosis of its nerves with the sympathetic, at a level with the two first dorsal pairs of nerves, produce the phenomena of *papillary hypertrophy* in the eye, followed later by *atrophy* of the *optic nerve.*

(6.) *Optic neuritis* and *neuro-retinitis*, caused by acute and chronic diseases of the nervous system, are generally found in both eyes.

(7.) In affections of the brain and its meninges, *optic neuritis* is most often more marked in the eye corresponding to the hemisphere most severely affected.

(8.) Changes in the *optic nerve* and the *retina*, accompanying disorders of sensibility, of intellect, and of motility, always indicate organic diseases of the brain.

(9.) These changes in the *optic nerve* and the *retina* should not be separated from other symptoms of the existing disease; their presence, however, is an element of diagnosis of positive certainty.

Ischæmia of the discs occurs in all intracranial affections which more or less directly distend the ophthalmic veins, as *meningitis*, *hydrocephalus*, and *intracranial tumors.* In *meningitis*, the exudation at the base of the brain may press upon, or the inflammation may involve, the cavernous sinus, in which case there is only *ischæmiæ.* Or the inflammation may creep down the nerve and cause *neuritis optici*, or it may mainly follow the sheath of the nerve and cause *peri-neuritis;* or it may both affect the sinus and the optic vein, and may creep down the nerve; in which case there will be both *ischæmia papillæ* and *neuritis.* The changes in the eye often occur early enough to be the first certain signs of the existing disease. The mirror also shews the presence, or the traces, of meningitis in a large number of children, and of adults who survive, and in whom the disease may not have been suspected. Such persons who have survived the disorder, tubercular or not, may wholly recover from a state of obscure and protracted ill-health; or a want of full mental power, or a capriciousness of temper may remain; or the reason or the affections may be changed to the degree of insanity. Hydrocephalus is very destructive to the optic nerves. If it be extreme, the discs and retinæ become wholly disorganised, and the optic nerves atrophied by pressure. *Ischæmia papillæ* is the earliest change.

Intracranial tumors, including not only malignant growths but cysts, aneurisms, and all local enlargements and thickenings, are, after meningitis of the base, the most frequent cause of *ischæmia* and *neuritis;* hence these conditions suggest intracranial tumors.

Disease of the cerebellum—tumors, inflammatory changes, and softening—cause mischief to the optic discs. Acute and chronic cerebritic softening alone never produces *ischæmia*, the changes in the optic nerve being *neuritis*, acute or chronic, and atrophy. In cerebral hæmorrhage, when the effusion is large, it causes stasis and infiltration in and about the optic discs by obstruction, and this is more marked in the eye corresponding to the site of the clot.

In symptomatic epilepsy, with coarse cerebral lesion, optic atrophy is common, being connected with the organic affection, but it is never associated with essential epilepsy; some circulatory troubles occur in the latter, and venous dilatations are said to have been seen in the central ganglia in severe cases. Dr. Hughlings Jackson has recorded many instances of convulsions beginning unilaterally in which there was double *optic neuritis.*

In general paralysis, atrophy of the discs is almost constant; but it is not an early symptom, appearing generally about the end of the first stage or the beginning of the second.

In disease of the spinal cord, simple progressive atrophy of the optic nerve is not uncommon. It is frequent in locomotor ataxy—sclerosis of the posterior cord—and has been observed in some cases of chronic myelitis, not attended with shooting pains. It probably depends upon an affection of the great sympathetic, through its communication with the anterior roots of the spinal nerves.

Coloured vision has been seen in epilepsy and in sunstroke. Colour-sensibility is of great importance to be recognised at the commencement of nerve atrophy, and in some forms of syphilitic disease. In *retinal apoplexies* the *chromatic* faculty is liable to alteration when the patches are very large, or when they affect the central parts of the *retina.* In *syphilitic retinitis* or *neuritis*, with or without choroiditis, the general impairment of sight is attended by loss of perception of green, and sometimes of red. In the *retinitis* of *albuminuria* or of *diabetes*, there is no colour-blindness until the disease has reached an advanced stage, so as to involve the external layers of the *retina* and *macula lutea.* In *atrophy* of the nerve the chromatic function suffers from the outset, especially with regard to red and green.

2. The ear furnishes *indicia* of cerebral disease by intolerance of sound, different degrees of deafness, and by noises heard in the ear—*tinnitus aurium.*

3. *Smell* and *taste* must also be inquired into as to perversion of function in cerebral diseases.

4. The *muscular sense* is so far a special one, and is often impaired in this respect, that weight and resistance cannot be realised;—muscular acts, such as walking, cannot be performed unless the patient looks at his legs and feet, and watches his own movements;—a sense of something intervening, which does not exist, between the sole of the

foot and the floor of the nature of a pad; or as if the limbs were moving against a volume of water—a sensation of wading deeply.

SECTION III.—DETAILED DESCRIPTION OF DISEASES OF THE BRAIN AND ITS MEMBRANES.

ENCEPHALITIS.

Natural History.—The precise seat of inflammation of the brain or of its membranes, is not capable of exact diagnosis during life. The most general fact that has been determined regarding this morbid state is, that there are two very distinct forms of *cerebritis* to be recognised both anatomically and clinically. While dissection demonstrates the fact that inflammation may exist either in the brain alone or in the membranes alone, yet clinically it is found that *meningitis* generally complicates *cerebritis*, and thus the phenomena proper to each of these morbid states become combined; and especially in that form of the disease in which the lesion is extensive, commonly known as "*general cerebritis*," "*phrenitis*," or "*encephalitis*." There is little interstitial exudation, connective tissue is scanty, and the most important changes take place in the nerve-filaments and nerve-ganglionic cells. They swell up, in the first instance, and gradually break up into a detritus, with more or less abundance of the compound inflammatory corpuscle of Gluge.

It is a rare disease, and may be caused by any of the morbid poisons associated with the *specific* or *constitutional* diseases, such as *pyæmia*, *glanders*, *typhus fever*. Most cases result, however, from mechanical injuries (*traumatic encephalitis*), not only from direct injuries affecting the brain after the skull has been penetrated; but numerous cases occur where the cranium has remained uninjured, and where there has only been an apparently slight contusion. In such cases concussion has been so great that the brain-substance has sustained a bruise, small vessels being ruptured, so that blood escapes. Such a lesion may not at first induce any signs of injury, but afterwards causes encephalitis. Other cases result from the excitement of insanity and uncontrolled moral feelings. In some instances encephalitis has followed the suppression of a cutaneous eruption, or the accidental inclusion of a nerve by a ligature applied to a blood-vessel. In others, caries of the bones of the cranium, and especially of the petrous portion of the temporal bone caused by *otitis*. Intemperance in alcoholic fluids also is a frequent cause of this, as well as of every other disease of the brain. Exposure to the sun's rays in very hot summer days, especially in tropical climates, is also a cause. As a secondary disease, encephalitis is produced by cancer, tubercle, and by every other structural disease incidental to the brain textures.

Encephalitis occurs at every age: in childhood, during the tendency to hydrocephalus; in adult age, from the action of morbid poisons and from mechanical and moral accidents; and in old age, from the natural decay of the frame. The frequency of this disease increases with age.

The symptoms are partly the result of destruction of the part of the brain affected, and partly the result of disturbance of the cerebral circulation, especially in the vicinity of the part, and therefore greatly influencing the functions of the brain.

In idiopathic inflammation the case may be acute or chronic. The first stage of the acute form is generally of short duration, and in so far the attack may be said to be sudden; and if there have been preliminary symptoms of ill-health, the symptoms have generally been headache or long-continued derangement of the digestive organs.

The general symptoms of the first stage of encephalitis may be but feebly marked (unless *meningitis* predominates). There is usually, in the first instance, some heat of head and of surface generally. The face is pale, and the pulse slow and irregular. The breathing is variable and sighing. There is slight feverish oppression, with headache and vomiting. *The nervous symptoms* are generally highly marked, and so are those of diminished functional activity in cases where the cerebral affection predominates as distinct from the meningeal. They consist of—

1. *Mental Phenomena.*—The patient is sullen, and his faculties become obscured. There is confusion of thought rather than delirium, which occurs only in a mild form when the patient doses.

2. *Sensorial Phenomena.*—Unless meningitis is present, there is no hyperæsthesia; but there is deep-seated, violent, oppressive pain, frequently described as shooting from the centre to the vertex, the temples, eyes, or ears; and it is out of all proportion to the intensity of the febrile phenomena; and while the febrile phenomena subside (as they very generally do in the course of twelve or twenty-four hours) the local pain does not diminish.

When the signs of meningitis co-exist and are unusually severe, the pain being deep-seated, and followed, after twelve or twenty hours, by convulsions and coma, there is commonly *meningo-cerebritis* of considerable extent.

When the *cerebritis* is local or partial, the symptoms are those which are usually regarded as indicating "inflammatory softening," "red softening," as commonly called, or "acute ramollissement."

They consist of—1. *Mental Symptoms*—namely, some loss of intellectual vigour, failure of memory, confusion of ideas, irritability of temper, and a consciousness of weakness—these symptoms becoming gradually persistent.

2. *Sensorial Symptoms*, such as pain of the head, dull, deep-seated, fixed, and protracted; tingling or numbness in one limb or side, imperfection of the special senses, dimness of sight, dulness of hearing.

3. *Motorial Symptoms*, as evinced in the loss of power of one limb or side—the most important of all the premonitory symptoms.

There is more or less fever in proportion to meningitis, with heat of head, vomiting, and general malaise. The signs of meningitis, on the other hand, may be feebly marked, but there may be convulsions, followed by coma, partial paralysis, with rigidity returning more or less rapidly, and ending fatally in a day or two, or from two to three weeks. Thus there may be the symptoms of meningitis, or of cerebritis, of both together, or alternately; and, occurring with such premonitory symptoms as have been indicated, they leave little doubt of the existence of a partial cerebritis.

Treatment.—So soon as there are any circumstances which may lead to "head symptoms" after injury, it is well to commence at once with local antiphlogistics, leeches, and evaporating lotions, such as *muriate of ammonia* in solution with *vinegar*, applied by cloths, to be frequently changed. The patient must observe a rigidly abstemious regimen, and rest with the head elevated above the shoulders.

MENINGITIS.

Natural History.—Inflammation of the immediate coverings of the brain, the *dura mater*, *pia mater*, and *arachnoid*, may be simple and idiopathic; or it may supervene as the result of some specific or constitutional disease, such as some of the specific fevers, or of the *syphilitic*, *rheumatic*, *gouty*, *rachitic*, or *scrofulous* cachexiæ. It is also known to occur in convalescence from *pneumonia* and *pleurisy*, or from *acute exanthemata* and *erysipelas*, especially also in *Bright's disease*, and from protracted diarrhœas. Three several forms (in addition to the general involvement of all) may be distinguished:—

1. Inflammation of the *dura mater*. This is almost invariably the result of injury or disease of the bones of the skull; and in such cases, the injury or disease by which it is caused may be readily distinguished.

2. Inflammation of the *pia mater* and *arachnoid.*

3. *Tubercular Meningitis*—Syn., *Acute hydrocephalus.*—The *meningitis* which accompanies the cachexia associated with *tuberculosis* is of a very distinctive kind, and frequently terminates the lives of tuberculous children. Its essential morbid character consists in the growth of tubercle on the arachnoid, generally in the shape of small miliary granules, resembling in appearance the Pacchionian bodies, but differing from them in minute structure and position. They are found most frequently and most abundantly within the fissure of Sylvius, between and upon the convolutions of the brain, and at the base of the brain, and very rarely on the cerebellum. They are generally of the nature of the grey granulations imbedded in the vascular network of the pia mater. Meningitis is also apt to occur as the result of *gout* or of *rheumatism*, constituting *gouty* or *rheumatic meningitis*, and it is an occasional if not a frequent consequence of *Bright's disease.*

The most important facts to be ascertained in the previous history of the case, before the development of cephalic symptoms, relate to the general health, and especially to any signs of cachexia or diathetic states, such as *tuberculosis*, *rheumatism*, *gout*, or of the specific action of implanted poisons, such as *syphilis.* It is important also to ascertain whether any blow on the head has been sustained, or if the patient has been much exposed to the sun ; whether any disease of the ear or nose exists; whether application to study has been intense, or to the cares of business.

Premonitory symptoms may be trifling or absent altogether. The most common are slight but increasing pains of the head, sensorial disturbance, irritability of temper, or restlessness, with some general *malaise.* Rigors quickly supervene or simple chilliness, with *cutis anserina* and pallor of the surface, quickly followed by febrile re-action. An attack of convulsions may supplant the rigors, especially in children. Such, however, are by no means common in the adult, and are not necessarily indicative of any severe or advanced lesion. The fever is commonly high ; the pulse sharp, hard, and frequent ; the respirations are irregular, performed with a sigh, and often with a moan.

In scarcely any other disease of the brain is the fever of a similar character and equal in severity to that of meningitis, and consequently it is of great importance in diagnosis to recognise it.

If the frequency of the pulse subside after the disease has lasted for some time—if it fall from 120 or 140 beats to 60 or 80, while the other symptoms of fever and the functional disturbance of the brain increase—the evidence is almost pathognomonic of *meningitis.* The skin is hot; the bowels obstinately constipated; and evacuations, when they occur, are dark and offensive. In this stage there is little or no prostration of strength. The headache of fever is supplanted by acute and intense pain; the face flushes and turns pale alternately; the eyeballs stare, and the conjunctivæ become injected.

The functional disturbance of the brain is partly of the character of irritation, and partly of depression, or of complete paralysis.

The purely nervous symptoms are expressed by—

1. *Mental Phenomena.*—The temper is extremely irritable. There is marked somnolence or wakefulness, and the two sometimes alternate for several days. The most marked feature is delirium, commencing early, and of a furious character, the patient screaming and gesticulating in the wildest manner; the expression of countenance is savage, malignant, or fierce.

2. *Sensorial Phenomena.*—Marked and continuous headache prevails, with exacerbations of a darting violent character, eliciting from the patient, and especially from children, a sharp piercing cry. Pain is increased by movement, and the patient holds the head with the hands; or, if a child, frequently carries the hands to the head. The headache is increased by sensorial impressions, and hence the eyes are obstinately closed, and the ears, if possible, kept covered with the bedclothes. *Double vision*, *tinnitus aurium*, *formicatio*, and subjective sensations of various kinds are present. The sensorial disturbances are highly marked.

3. *Motorial Phenomena.*—Restlessness is incessant, sometimes general or partial. The muscles of the face and limbs twitch involuntarily. There is strabismus, or the eyeball is unsteady, and with a contracted or oscillating pupil. Vomiting is frequent, without epigastric pain or tenderness, and often without nausea.

This stage generally lasts from *one* to *four* days, and its characteristics may be shortly expressed as consisting of—*the combination of great nervous hyperaction, with marked fever, a peculiar cry, cephalalgia, vomiting, and constipation.*

The second stage is one of transition, when the fever diminishes. The pulse sinks in frequency and force, becoming variable in frequency between very wide limits, and in very short intervals of time. Respiration becomes peculiarly irregular. The bowels continue constipated. The tongue becomes furred and dry. The heat of the head persists, but the body generally is cool.

The nervous phenomena present remarkable intermission during the further progress of meningitis.

Tubercular Meningitis in the Child.—It is an object to ascertain the existence or not of the scrofulous cachexia. If such exists, *tubercular meningitis* may supervene on the occurrence of any febrile disturbance, with slight thirst and anorexia; irregular and somewhat quick pulse; vomiting and constipation; clayey evacuations deficient in bile; red and moist tongue; dry and hot skin, and other phenomena of general derangement. The temperature, as measured by the thermometer, will be found to be persistently above the normal amount.

The following special nervous phenomena are very marked:—

1. *Mental.*—The child inclines to lie quiet, and resists being moved, as if pain was increased by motion. There is delirium, which is sometimes fugitive and sometimes persistent.

2. *Sensorial.*—Cephalalgia increases. The expression of countenance bespeaks great suffering, and the face looks aged. A peculiar piercing cry is now and again given by the child. The eyes are closed, and there is a tendency to drowsiness.

3. *Motorial.*—Strabismus and muscular twitchings occur. The pupils are variable, and often oscillate, and the eyeballs are unsteady. Grinding of the teeth prevails, occasional vomiting, unsteady restless movements, and dragging of the limbs. After three or four days of these premonitory symptoms:—

The third stage of tubercular meningitis may be ushered in by the general symptoms of approaching dissolution, such as coldness of the extremities, clammy perspiration, and an excessively rapid but feeble pulse.

Tubercular Meningitis in the Adult.—The symptoms occasionally assume an apoplectic, sometimes a convulsive form, at the commencement; and the febrile character is generally imperfectly marked. The premonitory symptoms are those associated with the scrofulous cachexia, and *meningitis* may occur at any stage of the lung disease. The following are its features:—

After some remission of chest symptoms, special nervous phenomena referable to the head may supervene. The phenomena being—

1. *Mental.*—The patient looks bewildered, with a dull, heavy, expressionless face, often highly characteristic. There also appears to be some *intellectual* incapacity to speak; the patient seeming to understand what is said or asked, looks at the inquirer for a few seconds, and then turns the head away without a reply. There is often marked somnolence.

2. *Sensorial.*—Pain in the head is the most striking symptom, fixed to one spot (generally the forehead), of considerable intensity, and is persistent for many days.

3. *Motorial.*—An attack of convulsions may precede every other symptom, but paralysis is rare.

The general characteristics of *tubercular meningitis* consist in the occurrence of fixed pain, vomiting, dulness of intellect, and duskiness of the face, with partial paralysis or convulsions, slight fever, and diminution of the chest symptoms in a patient demonstrably tuberculous. The indications of inflammatory action are only feebly marked, not only during life, but after death; and very often the febrile state which had existed before becomes less noticeable at the onset of cerebral symptoms. Still, heat of head, injected conjunctivæ, and flush of face denote a condition of vascular excitement; while persistent headache, with febrile symptoms in a patient otherwise phthisical, when it can be traced to no other known cause, is strong presumptive evidence of impending *tuberculous meningitis.* The aid of the thermometer should invariably be sought in diagnosis. But there are also cases in which the disease of the brain is marked by an absence of ordinary symptoms. The premonitory phenomena already noticed, for example, may be absent, especially in children; and then the steady persistence of any one symptom becomes of great importance in diagnosis—for example, sickness, headache, constipation, drowsiness, heat of head.

Acute Meningitis of the Aged seldom occurs suddenly, nor with the intense symptoms which prevail in the meningitis of early manhood. It commences insidiously, without rigors, and very frequently some days elapse before it can be recognised, even by persons familiar with the diseases of old age. The pulse is natural, the tongue remains clean, the bowels regular, and there is little or no vascular excitement, local or general, but the symptoms at the outset are purely of a nervous character.

1. *Mental.*—The temper is peevish or irritable, with more or less confusion of thought, inattention, and forgetfulness. "If infirm, and already an inmate of an hospital, the patient commits strange mistakes—takes possession of another's bed, uses the spittoon instead of the chamber-pot, and is frequently found lying outside the clothes, or with his feet where his head ought to be. When addressed, his answers are rational, but still there is a peculiarity in his manner and expression of countenance, an apparent slowness of comprehension, and a vacancy of the eye, that warns the physician of the approach of some cerebral disease."

2. *Sensorial.*—The appetite is slightly if at all impaired; and the skin remains of normal temperature.

3. *Motorial.*—Restlessness prevails, although prostration is apparent.

In walking, the gait is unsteady, and in lifting anything to the mouth the hand trembles. In a few rare cases the disease commences with convulsions.

The general features of the disease resemble typhus fever. The tongue becomes very dry, and generally brown in the centre. The bowels cease to act without medicine, but are not obstinately confined. Towards evening there is generally increased febrile disturbance, denoted by flushing of the face, where it had been previously pale and dejected; dryness of the skin, greater heat of the scalp, and acceleration of the pulse. In numerous examples, while dulness of intellect and somnolence are the first symptoms observed, in others great and unusual loquacity, with redness of the face and heat of the scalp, ushers in the disease. The progress of the disease is equally inconstant. In not a few cases the symptoms of febrile excitement are wanting; but dulness of intellect and stupor, with more or less insensibility of the limbs and relaxation of the sphincters, are frequently prominent symptoms throughout the whole course of the disease, as if the medullary substance of the brain were congested or suffered compression from early exudation on its surface. Such examples of an apoplectic character are more frequently met with in old persons addicted to fermented liquors, in whom the cerebral vessels are enlarged from repeated engorgement. Excessive venous congestion of the brain prevails in such cases during life; and the symptoms of meningitis are marked, and apt to be confounded with effusion into the brain, or softening of its texture.

Chronic Meningitis of the Aged is extremely subdued in its symptoms and insidious in its approach. It is not unfrequent as a result of albuminuria, or of repeated attacks of *delirium tremens;* or it follows *gout* or *rheumatism.*

The energies of the whole system are reduced. The functions of organic life are impaired. The appetite may be good, but digestion is slow, the bowels being inactive, and the various secretions vitiated or diminished. "Sooner or later the aged invalid takes to bed reluctantly. There he lies uncomplaining, vegetating, the mere wreck of what he formerly was, both in mind and body, gradually sinking, and dying often in consequence of sloughing of the hips and nates."

Treatment.—As a general principle, remedies have little influence over those forms of the disease which arise during the progress of any *specific* or *constitutional* disease, independent of the general treatment indicated for that disease. When meningitis arises from mechanical injuries, the treatment is generally by *bleeding*, *active purgatives*, especially by *calomel* and *scammony*, and by *cold applications* to the head. In chronic cases the cold *douche* has been strongly recommended —pouring cold water over the head from a pitcher held some distance above it. This remedy must be used with caution, as being a powerful depressant. It acts, doubtless, by cooling down the general mass of the blood; and patients almost always recover consciousness under its influence. To secure a lasting result it must be repeated at intervals of a few hours. In advanced life it rarely happens that the symptoms are so intense as to demand *general blood-letting;* but in vigorous constitutions this measure is sometimes necessary. The cases which demand it are those attended by high cerebral excitement and vascular action. But, as a rule, *local blood-letting* is not only more safe but more beneficial, and it can be repeated from time to time, as the nature of the symptoms may indicate; while *general blood-letting* can very rarely be resorted to more than once, and that only at the very commencement of the attack. The beneficial effects of *local blood-letting* may be greatly aided by keeping the head well raised, and by the constant application of *cold water* to the scalp; or the occasional use of bladders filled with *crushed ice.*

The bowels should be opened as rapidly as possible (unless the patient is feeble, emaciated, or greatly exhausted) by *calomel* and *jalap;* or four or five grains of the *compound extract of colocynth* should be given, combined with two or three grains of *calomel*, in cases uncomplicated with *Bright's disease*, and followed in a few hours with a dose of *salts* and *senna.* A fair proportion of nutriment must be given, in the form of *milk*, *strong beef-tea*, *sago*, *tapioca*, or *arrow-root;* and the patient should be kept in a quiet and darkened room, and with cold compresses constantly applied to the head. The more active symptoms being subdued, but not till then, a blister should be placed on the nape of the neck, if coma should ensue. The bowels should be kept open regularly, and the strength supported by mild unstimulating nutriment. When nervous irritability continues during convalescence, *henbane*, *codeia*, or *muriate of morphia* or *chloral* may be given. In the *chronic* form the periodical attacks of headache or of mental disorder may generally be relieved by a brisk purge; and the head should be kept cool by cloths dipped in vinegar and cold water, or by ice-bags applied to the head. If vascular excitement prevails, leeches may be applied behind the ears, or a seton in the back of the neck. The bladder must be kept empty of urine by the catheter; and although wine must be withheld during the active stage of the disease, it is beneficial when the vital energies begin to fail. In children I have certainly seen good results from inunction of the head with *mercurial ointment.*

The dietetic treatment should be strictly antiphlogistic, the patient especially avoiding all mental excitement; and, if not secluded, he should at least be kept tranquil, not only in body, but also in mind.

TUBERCULAR MENINGITIS—*Syn.*, ACUTE HYDROCEPHALUS.

Natural History.—An effusion of serous fluid between the membranes of the brain, or into its ventricles, associated with miliary tuberculosis of the meninges, or at the base, attending the meningitis of acute hydrocephalus. It may be limited to the membranes of the base of the brain. When the meninges generally are affected, miliary tuberculous growths are to be seen, and effusion is general in the ventricles. These lesions are generally part of an acute attack of scrofula, *with deposit of tubercles;* and occur in children who are of a scrofulous disposition, and who in later life would be likely to suffer from pulmonary consumption; or they are the offspring of consumptive or otherwise debilitated parents—badly nourished, physically ill-developed; but mentally often very sharp and bright. "Too wise and clever to live long," is a common saying regarding such children. They generally have a fine skin, very perceptible veins, long eyelashes, and a clear bluish sclerotic.

The brain affection is apt to be regarded as the primary disease; but on *post-mortem* examination it will generally be found that caseous degeneration of bronchial, lymphatic, and mesenteric glands, with tubercles in the lungs or intestinal canal, bespeak the general constitutional state of scrofula with deposit of tubercle.

In adults the development of acute hydrocephalus is generally subsequent to acute miliary tubercle of the lungs, or chronic pulmonary consumption, forming an acute complication to these diseases. The disease may also be a sequence to typhus, enteric fever, measles, or scarlet fever.

The age of childhood exercises a most remarkable predisposing influence upon this disease. At that period the rapid growth of the brain, the irritation of dentition, and the great susceptibility of the nervous system generally, are all powerful causes of determination of blood to the head. The greatest number of attacks occur between the second and the fifth year; or, as a more general law, the disease occurs from infancy to twelve years of age. During the first year of life, however, the disease is rare. Children with large heads and precocious intellects, and more especially those of a scrofulous diathesis, are its most frequent victims. It is said to be most common in the children of parents addicted to drunkenness, and from this cause it often runs in families.

The characteristic peculiarities of acute hydrocephalus with meningitis at the base, in the sequence of its symptoms, are so distinctly traceable to the functions associated with these parts as to give grounds for very certain diagnosis.

(1.) Irritation, and (2.) paralysis in the parts supplied by the *nerves of the eye*, the *vagus*, and *medulla oblongata*, starting from the base of the brain and passing through the foramina, direct attention to the child. Among the first signs are contraction, and then later, *dilatation of the pupil*, *ptosis of the upper eyelids*, *vomiting*, *slowness, and subsequent frequency of the pulse*, *peculiar changes of respiration*, and *depression of the abdomen.*

When effusion has taken place, the pulse, instead of being rapid, is then as slow, perhaps slower, than natural—sixty beats a minute, or less; but this is chiefly when the patient is in a horizontal position, for if he attempts to sit up, it again becomes rapid. The sickness (cerebral) is also abated; nevertheless, the child lies in a state of stupor and of great unwillingness to be moved, with his eyes half-closed, dull, and heavy, or perhaps staring or squinting; the pupil being still contracted begins to expand—first one and then the other—so that he may suffer from double vision. Loud noises do not then disturb the child, nor light influence the eyes. The stupor, however, is still interrupted by exclamations or shrill piercing screams, which are reflex (and presumably painless), while the tremulous hand of the little sufferer is incessantly engaged in picking his nose or mouth. As the disease advances, the capillaries of the brain are compressed by the effusion, loss of consciousness begins, epileptiform convulsions supervene, and paralysis of the extremities. For a time the inspirations are imperfect, and then the lungs are filled by a deep sighing inspiration; *coma* becomes deeper, the face assumes a dark colour, and appears pinched, with sunken eyes; and often tetanic contractions of the body cause a painful feeling to those unaccustomed to the sight of such a disease.

There is a morbid state resembling this disease which is neither *acute* nor *chronic*, to which Sir Thomas Watson has given the name of *spurious hydrocephalus.* In children from a few months to two or three years of age, of small make and of delicate health, this morbid state not uncommonly supervenes from exposure to debilitating causes. It is indicated by heaviness of the head and drowsiness. The child lies on its nurse's lap, unable or unwilling to raise the head. It seems half asleep, one moment opening its eyes and the next closing them again, with a remarkable expression of langour: the eyes are unattracted by any object put before them, and the pupils remain unmoved on the approach of light. The breathing is irregular, sighs are occasionally expressed, and the voice is husky. The tongue is slightly white, the skin is not hot, but sometimes colder than natural. In some cases there is now and then a slight and transient flush. Diarrhœa has often existed for some time, or the child has been severely purged by medicines, or having been weaned, has ceased to thrive since its change of food. The peculiar green colour of the stools, so frequent in this disease, seems to be imparted to them in the lower portion of the intestine, the fæcal contents of the upper portion being of a pale drab colour, while the bile in the gall-bladder is of a yellow colour. When this condition of things occurs in a more elderly child, it has been generally brought about by depletion, by loss of blood, or by medicines. As the more marked symptoms are sometimes ushered in by extreme irritability and a feeble attempt at re-action, cases of this "*hydrocephaloid disease*" have not unfrequently been mistaken for acute hydrocephalus, and treated accordingly, the patient being generally leeched out of its life. In very young children the diagnosis is sometimes very difficult between congestion and exhaustion, between fulness and emptiness.

Sir Thomas Watson suggests the following test:—"As a guide to diagnosis, take notice of the state of the unclosed fontanelle. If the symptoms proceed from plethora, or inflammation, or an approach to inflammation, you will find the surface of the fontanelle convex and prominent, and you may safely employ and expect benefit from depletion. If, on the other hand, the symptoms originate in emptiness and want of support, the surface of the fontanelle will be concave and depressed; and in that case leeches or other evacuants will do harm, and you must prescribe better diet,—ammonia," brandy, in arrow-root, milk from the mother's breast, if possible, and all such means as will tend to foster and nourish an infant.

Treatment.—Tuberculous meningitis in the form of *acute hydrocephalus* can only be successfully combated in the first or earliest stage. As the first symptoms are those characteristic of inflammation of the brain, and especially of its meninges, *leeches* behind the ears ought to be applied in the first instance. If this local abstraction of blood proves beneficial, it may be repeated during subsequent relapses. At the outset of the disease laxatives and ice compresses may also be used.

There is perhaps no class of cases in which the sanative powers of judicious blood-letting become so apparent as in plethoric children in whom the disease has been observed early.

The next thing is to purge the patient, if an adult. The purgative is not of great moment, provided it acts freely—such as two to five grains of *gamboge*, or five grains of *calomel*, with thirty grains of *compound jalap powder*. Such doses are to be followed up by a *black draught*, or the *sulphate of magnesia*. If convulsions prevail, *bromide of potassium* is to be given continuously in large doses.

The stools are generally black, or extremely offensive; and when this state of the bowels is corrected, the disease often ceases. If, however, the head be not relieved, some leeches should be applied to the temples, and the head should be shaved and surrounded with some cold evaporating lotion, such as a towel dipped in cold spring water, or in *vinegar and water*, or in solution of the *muriate of ammonia with vinegar*. If the disease be advanced, no efficient treatment has as yet been determined.

INFLAMMATION OF THE BRAIN.

Natural History.—Inflammation of the brain substance, with or without implication of the membranes, is usually partial. In many cases it is dependent on local injury or foreign deposit, and is thus rarely uncomplicated and primary. As a rule, it results as a consequence of previous diseases, especially *specific fevers*, *exanthematica*, *diseases of the ears*, *extravasations of blood*, *tumors or tubercles of the brain*, *alcoholic poisoning*, *or external injury*. The most intense in degree, and at the same time often the most limited *cerebritis*, is from injury. The whole of the brain substance is rarely if ever affected, but one limited portion or several separate portions may be affected simultaneously in the white or grey parts.

Violent headache, intolerance of light, excited action, and excessive sensitiveness of all the special senses, delirium, rapidly followed by convulsions and coma, indicate the nature of the phenomena in series which mark the onset and course of inflammation of the brain. The unusual hyperæmia is certain to be attended by excitability of the nerve-filaments and ganglion-cells. These constitute symptoms of *cerebral irritation*, as they are commonly called. On the other hand, there may be symptoms of *cerebral depression*, arising from diminution or absolute paralysis of excitation in these nerve elements. Usually the symptoms of irritation precede those of depression. *Cerebral irritation* expresses itself more prominently, sometimes in the *sensory*, at another time in the *motory*, or at another time in the *mental* functions.

Expression of cerebral irritation in the *sensory* functions is manifested by *headache*, which is a frequent but not essential symptom of all cerebral diseases. How *headache* occurs is still unexplained. Increased sensitiveness to impressions on the part of the senses may have an explanation similar to what may account for headache—namely, that the *brain* generally, as well as organs of special sense, may have an increased hyperæsthesia, such that irritations or impressions may annoy or excite, which in other normal circumstances would not have been noticed.

Expression of cerebral irritation by *motorial symptoms* consist of restlessness, sudden starting, gnashing the teeth, crying out, twitching of single muscles, and general convulsions.

The expression of cerebral irritation by *mental states* mainly consists in a rapid change and loose connection between the thoughts, so that clear thinking is impossible. Ideas are thus confused, and the patient has false notions about himself and the world generally. He is, in a word, "delirious." So real and intense is the delirium that it cannot be distinguished from true perceptions. Hence he has *hallucinations* and *illusions.* Conditions directly opposed to these are indications of cerebral depression.

Treatment.—What has been said regarding *encephalitis* and *meningitis* can only be repeated here.

RED SOFTENING OF THE BRAIN.

Natural History.—From what has been stated under the preceding subjects, there are several states to be distinguished within the cranium connected with inflammation, namely,—(1.) "Inflammation of the brain substance," with or without implication of the membranes, usually partial, and in many cases dependent on local injury, or specific deposits, or growths, or specific fevers; (2.) inflammatory red softening, or acute ramollissement, to the consistence of pulpiness or of cream-like consistence from occlusion of vessels, as contra-distinguished from (3.) "white softening of the cerebral substance," the result of an *atrophic* process and impaired nutrition; and (4.) abscess.

The clinical history of softening seems closely to resemble that of cerebral hæmorrhage, and it is very often impossible to tell whether the physician has to deal with a case of *apoplexy*, as commonly understood, or a case of *cerebral softening.* The premonitory symptoms peculiar to softening appear to be absent in a half, or more than a half, of the cases. In some instances, however, the premonitory symptoms afford strong probability of softening, and are of much value: the absence of them, however, cannot be regarded as equivalent to the absence of softening.

The attack itself may be gradual or sudden. Thus, after the progressive development, during some hours or days, of such premonitory symptoms as have been mentioned in the previous affections of the nervous system, the patient gradually becomes apoplectic, or he may at once appear to become so suddenly and instantaneously, without the premonitory symptoms. In the latter case, however, the attack is due to spasm of the vessels; it gradually passes away, and the patient recovers intelligence, but confirmed symptoms of softening may follow after.

Transient excitement or mild delirium may precede the abolition of perception; and when this does occur it is highly characteristic. Coma is frequently developed abruptly, and is often of the following peculiar character:—The patient lies still, as if in a profound sleep, but immediately gives the hand or puts out the tongue, if told to do so, intelligence remaining intact. The loss of perception and volition, however, is not recovered from. Dulness and obscuration of thought and perception prevail often to a marked degree.

The Sensorial Symptoms are not so well marked as the *motorial.* Hyperæsthesia has erroneously been considered pathognomonic of ramollissement, perhaps because it is more common in softening than in any other apoplectic disease. Numbness and a sensation of cold are not at all unfrequent.

The Motorial Symptoms are of two kinds—namely, paralysis and spasmodic contractions of muscles. The face-muscles act unequally, producing deviation of the features, sometimes very slight, at other times highly marked. Speech is almost constantly impaired, and after slight recovery it continues to be so. Paralysis is commonly limited to one side, sometimes to one limb, but in rare cases it is general. The spasmodic contractions are either of a tonic or of a clonic kind, rigidity or occasional spasm being found in either the paralysed or non-paralysed limbs,—most commonly in the former.

The physician, however, will not derive much information from the mere recognition of the presence of single symptoms: it is by a close observance of their combinations that exact diagnosis will be insured. The following combination of symptoms are those which may with most probability be referred to softening:—(1.) Imperfect coma, partial loss of perception and volition, with rigidity of the limbs; (2.) perfect coma without rigidity; (3.) paralysis without loss of consciousness; (4.) paralysis with hyperæsthesia; (5.) rigidity, coming on after the return of perception and volition.

The after-symptoms of softening are also strikingly different from those of apoplexy. The morbid phenomena do not suddenly disappear, nor is there the gradual improvement which takes place after apoplexy.

Enfeeblement of the mental powers most commonly persists, and the motorial phenomena remain. Slight apoplectic-like seizures occur, convulsive movements and rigidity increase, and some little febrile excitement becomes developed, which in severe cases generally assumes a typhoid type, with brown tongue and rapid pulse. From such a condition recovery is rare. *Ramollissement* of the brain is more frequently an acute than a chronic disease, the greater number dying before the twelfth day.

Treatment.—In diffuse inflammation of the brain arising from mechanical injuries or hæmorrhage with obvious plethora, bleeding and antiphlogistic treatment generally are most beneficial, when employed with a wise discretion and at an early period. When, however, inflammation occurs during the progress of a *constitutional* disease, blood-letting is inadmissible. In acute idiopathic *ramollissement* of the brain the treatment can hardly be said to be determined or uniform; but general bleeding is only to be practised with benefit when the disease is associated with plethora and general congestion of the brain. Absolute rest and quiet, in the recumbent position but with the head high, and plenty of fresh air, are essential.

Most advantage is to be afterwards derived from the use of tonics and a nutritive diet. As a general rule, *cerebritis* does not admit of so copious depletory measures as *meningitis*. In acute cases, where the premonitory symptoms of congestion are obvious and urgent, bleeding may be carried to a considerable extent, consistent with the nature of the case and the individual; and after a reasonable quantity of blood has been taken without producing nausea or fainting, the bleeding may be again repeated till some decided impression is made. In many cases, on the other hand, cupping, or bleeding by means of leeches to the temples or back of the ears, may be more useful than venesection. Such cases are indicated by the signs of determination of blood to the head, heat of the scalp, suffusion of the eyes, redness of the face, with or without inordinate action of the carotids. Such cases are also more likely to be benefited by the cautious repetition of this treatment than by general blood-letting, which can very seldom be required in persons turned of fifty.

Even when the pulse may seem to warrant bleeding, and at a time when bleeding may seem safe and proper, it is advisable, before having recourse to this measure, carefully to examine the state of the heart, the state of the arteries at the wrist, and the condition of the corneæ. By such an examination, assisted by the previous history of the case, the condition of the cerebral arteries will best be indicated, and the readiest clue gained to the probable nature of the cerebral affection. If the heart's action and sounds are feeble, or if signs of valvular insufficiency are present, it is probable that the softening is anæmic, atrophic, degenerative—a consequence of partial inanition, and not of partial cerebritis. This conclusion is still more probable if the radial arteries are rigid, and if an *arcus senilis* is fully developed. To bleed under such circumstances is unwarrantable. Tonic restorative treatment is demanded.

In severe seizures resembling apoplexy the bowels should be opened by an enema of *castor oil* and *turpentine.* In less urgent cases, where there has not been loss of consciousness, or where it has been restored, and the patient is able to swallow, a purgative of *colocynth* and *calomel*, with or without *croton oil*, may be substituted for the enema. Perfect rest in the recumbent posture must be enjoined, with the head slightly elevated, and all constrictures of dress removed from the neck. The scalp should be kept cool by rags dipped in *cold vinegar and water*, or iced water. The feet must be kept warm. If much re-action supervene, leeches may be applied to the head; and should the pulse be weak, twenty or thirty drops of the *spiritus ammoniæ aromaticus* may be administered. The catheter may require to be used ; and the bladder must always be examined, in case the urine may be retained. Nourishment must be given in small and oft-repeated quantities, and mental disturbance prevented.

If sanguineous effusion has actually happened, *calomel*, to the extent of permitting the mouth to be made slightly tender, is believed by not a few to encourage absorption. It can only, however, be given in healthy subjects free from gouty or renal disease. It may be given in the form of *three* or *four* grains of *blue pill* and two of *James's powder* every evening for ten days or a fortnight, the effects being carefully watched, so that the gums should not be more than touched; or as *hydrarg. cum creta.*

To allay the pains in the palsied limbs *opiates* are of great value. They procure sleep and subdue tetanic rigidity of the flexor muscles. *Muriate of morphia* may be given in doses of one-sixth to one-fourth of a grain at bedtime; and the doses may after a time be increased, if necessary; and may be combined with extract of *colocynth* or *croton oil*, to counteract the tendency to constipation.

Yellow Softening of the Brain.

Natural History.—This form of softening is usually in the greater hemispheres, in their medullary portion, and is due to death of a portion of its tissue. The lesion may vary in size from that of a bean to that of a hen's egg. In the extreme condition of softening the cerebral substance is changed to a moist gelatinous pulp, varying in colour from greyish-white to yellow. The surrounding portion of brain is generally reddish, from dilated vessels or hæmorrhagic infarction. The yellow colour of the softer portion generally depends on the changes which go on in the blood extravasated in such capillary hæmorrhages. The softened and disintegrated brain-substance becomes charged with the colouring matter of the blood; eventually the lesion is converted into an areolar network, filled with a yellow chalky milk-like fluid. This yellow softening is in reality a form of gangrene. It comes suddenly, without any preliminary inflammatory or hæmorrhagic stage, and at once proceeds to complete disorganisation. The entire duration of this form of softening may not exceed three or four days. The effects of the several forms of softening on the system are not well defined, and cannot be considered as in any way distinctive, so that those already indicated embrace all that can be detailed. Softening in the central ganglia is generally speedily fatal, death usually taking place within two or three days, and is rarely prolonged to the sixth day. Within the substance of the protuberance it is still more rapidly fatal.

Softening of the brain may succeed at least five morbid states, namely: —(1.) The blood-stroke on parts already morbid (*coup de sang*). (2.) The effusion of red blood, which separates and breaks down the delicate texture of the part in which it is effused. (3.) As a process which accompanies or follows hydrocephalus. (4.) As a degeneration of arteries or of embolic infarction of vessels. (5.) It may take place in the cerebral substance surrounding tumors. Whatever may be the circumstances under which softening is developed during life, or the form it assumes after death, the lesion is not so much a substantive disease as the effects of a morbid process taking place under several different conditions of the brain.

Treatment must be by food restoratives. Blood-letting and lowering treatment are not to be thought of.

ABSCESS OF THE BRAIN.

Natural History.—Suppurative inflammation of the brain, terminating in a collection of pus, is sometimes found in the substance of the brain (*Apostema cerebri*):—(1.) Collected into the form of an abscess; (2.) Infiltrated into the substance of the brain; or (3.) On the convolutions, in the shape of a ragged ulcer, varying in size from a fourpenny-piece, or less, to that of half-a-crown. It is in this latter form and site of the suppurative process that well-formed pus-corpuscles can most frequently be detected. Such abscesses increase till they open into a ventricle, or reaching the meninges, extensive meningitis may occur. In other instances ulceration may take place through the cerebral membranes as far as the calvarium or skull bones. The ulcer may perforate the bone, or open into the cavity of the tympanum. If the ulcers be incorporated by new connective tissue formations, they have a regular form and smooth walls. If the abscess has existed a long time, the capsule is dense, and the contents thickened by re-absorption of the fluid part, the remainder being converted into a cheesy chalk-like mass.

The most frequent cause of cerebral abscesses is internal *otitis*—a lesion which often results from *scarlet fever*, *typhus fever*, *small-pox*, *measles*, or *scrofula*. The ear affection which causes the discharge is usually either disease of the tympanic cavity or of the *dura mater* investing the temporal bone. The inflammation which terminates in abscess of the cerebral substance is usually the effect of inflammation of the membranes, and in some instances of the discharge being suddenly checked, and the chronic external inflammation being suddenly converted into an acute internal disease. The inflammation is generally observed to succeed quickly the suppression or disappearance of the external discharge. It is generally observed in cases of scrofula. Abscesses also occur as the sequelæ of inflammations of distant parts, as of *pneumonia*, *pericarditis*, *enteritis*. They may also occur as so-called metastatic abscesses in *pyæmia*, and as a result of traumatic injury.

The symptoms of abscess of the brain are likewise extremely obscure, and the latent character of brain abscess is important in diagnosis. Sudden headache is the symptom which most frequently excites attention; and it is generally accompanied by febrile symptoms and vomiting. The patients become heavy, morose, and may be delirious, with contraction of the pupils and photophobia. Difficult articulation, numbness, formication, and convulsive attacks may supervene. While the intellect may suffer comparatively little, sensibility suffers more frequently; and headache, generally at first diffused, is more or less intense, and subsequently becomes unilateral. Coma occurs frequently, is often temporary; and paralysis occurs in about one-half the cases. The paralysis is generally local; but it may assume the form of general muscular debility. The duration of such cases fluctuates from two or three weeks to two months.

APOPLEXY.

Natural History.—A disease characterised by the sudden loss, more or less complete, of volition, perception, sensation, and motion, depending on sudden pressure upon the brain (the tissue of which may be morbid), originating within the cranium. The literal meaning of the term *apoplexy* conveys the idea of a *sudden stroke;* and it has been usual to limit the term to the results produced by extravasations of blood into the nervous tissue of the brain, a portion of which is thus destroyed. More comprehensive pathological doctrines teach us to give a wider signification to the term. It is now used to characterise a group of symptoms irrespectively of the anatomical conditions upon which they may depend. These symptoms consist of—(1.) Premonitory warnings, extending over variable periods (seconds, weeks, months, or years), marked by sundry derangements of the nervous functions, such as loss of memory, dulness of sensation, or diminished power; (2.) The individual is more or less suddenly deprived of volition and perception in their relation to sensation and motion. Consciousness is thus more or less lost, and paralysis is more or less complete. The patient may fall to the ground completely insensible, or he may only stagger and cling to some object for support. The respiration and circulation may be unaffected, or the former may be stertorous and the latter laboured. Some group of muscles, a side of the body, or the whole body, is paralysed, flaccid, motionless; or it may be rigid with tonic, or convulsed with clonic spasm. From this state the patient may never recover. Life becomes gradually extinguished, or the sufferer may recover partially or entirely; in the former case leaving some mental, motorial, or sensorial faculty impaired for weeks, or for the whole of after-life. The essential phenomena of an apoplectic seizure consist in the severance of the brain-functions, namely, volition and perception from motion and sensation: the other symptoms that occur are additional phenomena, depending on secondary changes subsequently induced in the part, or its vicinity, which has been the primary seat of lesion.

The phenomena of the *apoplectic state* are due to a variety of local lesions, or complex morbid states, and not to any single constant lesion. One or more of the following local lesions or complex morbid states may induce the apoplectic condition, namely:—(1.) Functional disturbance of the brain, spasm of vessels, or determination of blood to the head—*congestive apoplexy.* (2.) *Hæmorrhage*, or extravasation (*a.*) into the substance of the hemispheres or cerebellum, (*b.*) into the ventricles, or (*c.*) into the arachnoid cavity. One or other of these lesions constitutes apoplexy in the common acceptation of the term—*sanguineous apoplexy* or *cerebral hæmorrhage.* (3.) Sudden serous effusion in large quantity is equally efficient in bringing about the apoplectic state commonly called *serous apoplexy*, as in *tuberculous meningitis.* (4.) *Local* *cerebritis*, or softening of the brain. (5.) Fibroid indurations and tumors of the brain, or *meninges*, including acephalo-cysts. (6.) The progress of various specific and constitutional diseases from blood-poisoning. (7.) *Anæmia*, as in the hydrocephaloid disease of children, disease of the heart, and vascular obstructions, such as thrombosis and embolism. (8.) *Abscess.*

To the phenomena produced by the first three of these conditions only, has it been common or usual to apply the term *apoplexy.*

In apoplexy from functional disturbance, the face, scalp, and conjunctivæ are increased in vascularity; the skin generally is of a dusky venous hue, and the surface is warm. There is fulness of the jugular veins, with increased pulsation in the carotids. The tongue is foul, and nausea prevails, with constipated bowels. Respiration and the pulse are both laboured, and the extremities are cold. The activity and power of the intellect are diminished. General confusion of thought prevails, with deficient memory. Any attempt at mental exercise increases the expression of these signs; so does the absolutely recumbent position and emotional disturbance. Sleepiness, with laboured respiration, is common, especially after meals; and there is a general tendency to inaction of body as well as of mind—a "not-to-be-disturbed" sort of desire is experienced. Such mental phenomena, however, are not permanent; and while there is a readily induced state of general confusion, there is no persistent, special, or permanent loss of power of intellect. The senses generally are obtuse. The hearing is dull; and heavy rumbling noises are constant auditory illusions. The sight is dim, or *amaurosis* is complete, and often black or variously-coloured spots are seen floating in the field of vision. Flashes before the eyes, or other spectral illusions, are more or less constant. The patient may see only half of an object, or halves of objects of different colours. Attacks of dizziness also occur, with a sense of fulness and oppression in the head; numbness and weight of the limbs; dull and heavy *cephalalgia.* There may also be occasional feelings of formication and numbness in certain limbs, momentary loss of memory for some words and figures, or temporary paralysis, confined to certain groups of muscles. These symptoms are only of occasional occurrence, and change their localities. Little jerkings of the muscles, and irregular or sluggish movements of the eyeballs, are occasional.

These precursory symptoms having generally been more intense for a few minutes or hours, an attack takes place, distinctly apoplectic. These "warnings" which precede an attack of apoplexy may, in some cases, depend on occlusion of small vessels, or on small capillary hæmorrhages.

Thrombosis and embolism (lesions to be afterwards described) now take a prominent place in cerebral pathology, both as regards cerebral softening and hæmorrhages. By occlusion of a cerebral artery, or of capillaries, clots in blood-vessels are capable of producing apoplectic symptoms, even when the brain substance is otherwise sound. There is always paralysis of motion in the side opposite to the obstructed vessel, general sensibility, as a rule, being unimpaired; sometimes it may be lessened, but is never altogether absent. Loss of consciousness is also less complete, and the mind is less affected after cerebral embolism than after hæmorrhage. Aphasia sometimes happens. The middle artery of the brain is the most frequent seat of embolism, then the anterior, basilar, and vertebral. Apoplectic symptoms, hemiplegia, and death have also followed plugging of the carotid, and of the innominata, right common carotid, and left internal carotid, and middle cerebral.

The seizure commonly occurs during some muscular exertion, such as lifting a heavy weight, pulling on a pair of boots, blowing the nose, straining at defecation, or the like; or even upon a simple change of posture, such as stooping, or suddenly assuming the erect attitude. The manner of appearance and proportion between the three groups of nervous symptoms is of great diagnostic value.

As indicative of functional disturbance, rather than of *hæmorrhage* or *softening*, any one of the following combinations of groups of symptoms are of importance to be noticed:—1. The simultaneous development of the three groups of nervous symptoms. There being either—2. Distinct loss of perception, profound coma, and general paralysis, without rigidity or convulsion. 3. Imperfect loss of perception, with general paralysis. 4. General paralysis, incomplete in degree, and sensation unimpaired, or but little affected; or—5. Paralysis complete in degree, but without stertor or rigidity.

The non-existence of precursory symptoms in a given case is in favour of the belief that hæmorrhage rather than functional disturbance is the cause of the lesion or softening.

The more common combinations of symptoms by which the existence of cerebral hæmorrhage limited to the medullary substance might be inferred, are—1. Profound coma, with hemiplegia, of marked intensity, and without rigidity. 2. Paralysis of both sides, but one more profoundly affected than the other—a rare occurrence in limited hæmorrhage. 3. Slight coma, but paralysis hemiplegic and complete.

A large apoplectic clot which destroys the *corpus striatum* or *thalamus opticus*, leaves a *hemiplegia* that never disappears; but small clots in those parts by which nerve filaments are unbroken and ganglionic nerve-cells are unimpaired, and only temporarily pressed apart, leave paralysis, which is only temporary.

Extensive apoplectic clots at other parts of the cerebrum not unfrequently leave paralysis, which sooner or later disappears; the capillaries of the motor centres being relieved of pressure by the partial re-absorption of the extravasation, so become again permeable to blood; or the collateral œdema in the vicinity of the broken-down part of the brain, which extended to the motor centres, disappears with cicatrisation and contraction of the apoplectic clot.

Hæmorrhage into the ventricles cannot in some cases be distinguished from arachnoid extravasation, or in others from effusion into the cerebral substance only, especially when in the vicinity of the ventricles. The cases, however, which are less doubtful are marked by coma, which is very profound at the commencement, and remains of equal intensity; or, the patient, after partially recovering from a slight seizure, is again suddenly plunged into profound coma, from which there is no recovery. This second attack is presumed to indicate the rupture of the hæmorrhage either into the ventricles or the arachnoid cavity, from its original site of extravasation in the medullary substance of the brain near the ventricles or near the surface. *Paralysis* is complete in degree, and is developed simultaneously on both sides; or, after having been hemiplegic for a short time, it becomes general; when the coma of the second attack above noticed comes on, stertorous breathing is strongly marked. Involuntary evacuations follow. The pupils remain dilated. Deglutition is dangerous and difficult. When the paralysis is general and the coma profound, it is almost a sure sign that hæmorrhage has taken place to a considerable extent into the ventricles. *Rigidity* or *tonic contraction* of the muscles is present in many cases of hæmorrhage, and in nineteen out of twenty-six cases occurs in the paralysed limbs; and in about four out of twenty-six cases may be seen in those of the healthy side. Its presence is a sign of extensive hæmorrhage, with laceration of the brain. The most frequent combination of symptoms indicative of hæmorrhage into the ventricles, may be shortly stated to be *profound coma, with general paralysis and rigidity.*

Arachnoid hæmorrhage occurs when the extravasation bursts through the pia mater and arachnoid into the space between the membranes, and such cannot be distinguished from the *ventricular extravasation* just noticed. If, however, the extravasation is immediately subarachnoid at first, and of limited extent, it may be approximately diagnosed,—*First*, by the nature of the premonitory symptoms having partaken of meningeal inflammation, such as by severe pain in the head, with impaired intelligence and power of movement. *Second*, The attack is less sudden than in cases of congestion or of central hæmorrhage, and the symptoms are progressively developed.

The following are the combinations of symptoms which indicate the occurrence of subarachnoid hæmorrhage:—(1.) Complete and profound coma without paralysis; or with general paralysis very slightly developed in intensity. (2.) Complete loss of consciousness without paralysis; but combined with rigidity or clonic contractions of the limbs. (3.) Paralysis of hemiplegic distribution as regards the limbs, but without deviation of the features, the muscles of the face not being implicated. (4.) An apoplectic attack without anæsthesia. (5.) Imperfectly developed coma with general paralysis. (6.) An apoplectic attack, of which the symptoms are somewhat interchangeable or remittent.

The following conclusions have now been arrived at from a comprehensive view of numerous cases:—(1.) That in by far the greater number of cases, cerebral hæmorrhage is due to softness of tissue and small support to vessels; to degenerations in the form of miliary aneurisms, common in old people, of the cerebral arteries, fatty metamorphosis, or simple atrophy, with the various forms of consecutive dilatation; while in the larger arteries of the base there is *arteritis*, issuing in ossification, or fatty degeneration, or passive calcification. (2.) True aneurisms of the large cerebral arteries in a few cases. (3.) Hypertrophy of the left ventricle will only favour cerebral hæmorrhage when it permanently increases the normal tension of the aortal system; but this is not the case in compensating hypertrophy of valvular disease of the heart. (4.) In about one-seventh of all cases of apoplexy, neither predisposing diseases of the heart nor of the vessels could be demonstrated. The connection of apoplexy with advanced disease of the kidney has occasionally attracted the attention of pathologists. Extremes of temperature are likewise powerful predisponents to apoplexy. The powerful effects of *moral causes* in producing this fatal disorder are also to be recognised.

Treatment.—The patient, if seen during the fit, may be bled if the tendency to death is by *coma*, and the pulse be full, or hard, or thrilling; if the vessels of the neck be congested, the heat of the scalp increased, and if the blood-vessels of the face be full and turgid. The state of the heart ought to be examined into first. If its action be vigorous, its impulse strong, and its sounds loud but normal, and the heat of the skin preserved, blood-letting is still more required. Slow and deep respiratory movements, with stertor, add greatly to the necessity of immediate venesection, if there be no signs of commencing œdema of the lungs. The beneficial action of the remedy is shewn by the pulse becoming softer, more subdued, and more regular. The bleeding may then be allowed to proceed till an obvious impression of this kind is made, or even until the pulse begins to flag. Large bleedings, however, are to be avoided. Ten ounces will generally be sufficient, if taken at the first outset of the attack; but if the pulse does not improve, and other symptoms remain unrelieved, sixteen to twenty ounces may be taken. The indications for blood-letting being thus strongly pronounced, "we ought not to hesitate to open a vein, regardless of the age of our patient." The blood ought to be permitted to flow from a large opening, in order to relieve the congestion, to check, if possible, a further effusion of blood, and to divert its active flow from the head. The quantity taken should be proportioned to the degree of stertor, and to the powers of the patient. The head and shoulders should be raised while the blood is flowing.

If, on the other hand, the pulse be small and slow, feeble, or almost imperceptible, the skin cold and clammy, with a tendency to death by syncope; if the heart's action be feeble or weak, and the pulse irregular; if the patient has been of intemperate habits, or is suffering from organic disease of the heart and arteries; or if there is a gouty or rheumatic history, then no advantage is to be gained by the abstraction of blood at this time and in this way. Blood-letting is therefore contra-indicated, under the following circumstances:—(*a.*) Anæmia, (*b.*) aortic valvular disease, (*c.*) in cases commencing with syncope. In such case the use of stimulants and restoratives must be had recourse to in order to prevent paralysis of the heart.

Blood-letting is never to be adopted as a matter of course.

If the blood-letting is not followed by some degree of consciousness, it may be inferred that the amount of blood effused is considerable, and that the patient, in all probability, will not recover. Still, an additional chance of recovery may be given by applying to the head cold cloths, or crushed ice in a bladder, leeches to the temples, and mustard cataplasms to the feet and limbs; also by placing a drop or two of *croton oil* on the tongue, and by throwing up a cathartic enema of castor oil or other purgative, or a stimulant enema of turpentine.

Active and searching purgatives generally do good. Five grains of *calomel*, with a drachm of *compound jalap powder*, given as soon as the patient can swallow, and followed up by *black draught*, or by an ounce of *sulphate of magnesia* with *camphor mixture* every four or six hours, and continued, according to its effects, for a greater or less length of time, are the best means we have for promoting recovery, and for preventing a relapse.

These medicinal prescriptions are recommended on the supposition that the attack has been associated with simple plethora. In many cases, however, it is a consequence of hypertrophy of the heart, without valvular disease. And in such cases, eight to ten minims of *digitalis* may be added to each dose of the purgative medicine. If the power of swallowing is in abeyance, then three or four drops of *croton oil* should be put on the back part of the tongue, and stimulating enemata thrown up the rectum.

The diet of the patient should be low, till all apprehension of a relapse is past—limited to *milk*, *boiled vegetables*, *light puddings*, and *fish*. At no subsequent period ought he to indulge in a full *animal diet*, or to drink *undiluted wines*. At the same time, too lowering a regimen is to be avoided, as thereby the irritability of the system and the heart's action generally are increased. All the causes of the disease already fully referred to should be avoided, counteracted, or overcome. The diet and the bowels should be carefully regulated, and the patient placed under the best possible hygienic influences; mind and body must be kept at rest. A sojourn at the waters of Wildbad, Gastien, Pfäfers, or Ragatz, often gradually improves patients suffering both from cerebral and spinal paralysis. The *induced current of electricity* is also beneficial. It seems to improve the nutrition of the paralysed muscles, which tend to atrophy from long disuse; and paralysis tends to get worse from diminished excitability of the nerves. Local *Faradisation* by induced currents of electricity gives artificial exercise to these muscles, and thereby improves their functional and nutritive properties. *Arsenic*, *quinine*, *iron*, *cod-liver oil*, *phosphatic syrups*, and *hypophosphates* are the most useful tonics. (See also under next topic.)

HÆMATOMA OF THE DURA MATER.*

Natural History.—Sanguineous encapsuled flattened masses, composed of fine layers of fibrine, spread to a greater or less extent over the under surface of the *dura mater*, accompanied by repeated small extravasations of blood, which are converted into pigment. By repetition of the process several layers come to be deposited one upon the other. Numerous and large blood-vessels form in these layers; and from these vessels renewals of the hæmorrhages occur. The disease is chronic, and is apt to terminate, after continued cephalic suffering, generally suddenly, with symptoms of apoplexy.

These tumors of bloody formation seem to occur in connection with more or less inflammation of the *dura mater*. The effusion of blood between the *dura mater* and the arachnoid is not in most cases a primary occurrence, but the productive results of inflammation first occur; and the new growth is developed into a fibrous membrane traversed by a copious network of new-formed blood-vessels. It is from the rupture of these new vessels that extravasations proceed. The lesion is sometimes described as due to *intrameningeal* apoplexy, with false membranes on the *dura mater;* but the false membranes, which are the result of the chronic inflammation, precede the apoplectic phenomena. The *hæmatoma* often attain a considerable size. It may be from four to five inches long, by two and a half inches broad, and one-half to three-quarters of an inch thick. It is generally of a flattened circular form, with a central elevation, and usually located near the sagittal suture. The long diameter is parallel to the falciform process. The tumor generally occurs on one side only; or, if bilateral, one is more developed than the other. The walls of the sac are generally of a rusty colour, from the altered colouring matter of the blood, and the contents of the sac are partly fresh fluid or partially coagulated blood, in the form of dirty red-brown clots. The cerebrum below is flattened, and may even shew a depression. The affection appears to occur only in the adult, and generally after the age of fifty. In recent cases very fine layers of fibrine are found, to a greater or less extent, spread over the surface of the *dura mater*. By repetition of the inflammatory process, numerous layers of fibrine become deposited one upon the other; and much more numerous and larger blood-vessels form in these layers than are to be met with in the *dura mater* itself. From these new-formed vessels the hæmorrhage proceeds which gives rise to the formation of the *hæmatoma*, and its cystic enclosure is formed by the extravasation taking place between the layers of the false membrane.

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* This disease is not mentioned by the College of Physicians, in their nomenclature, as distinct from inflammation of the *dura mater*.

Old age, disorders of the intellect, chronic alcoholism are the kind of cases in which the lesion is found; and sometimes it seems traceable to external injury. In such cases years may intervene between the injury and the symptoms of hæmatoma. Of several specimens of the lesion preserved in the museum of the Army Medical Department at Netley Hospital, one occurred in a soldier thirty-three years of age, with a history of tropical service, epilepsy, fever, and lunacy, and finally death with apoplectic symptoms; a second occurred in a soldier twenty-seven years of age, with a history of epilepsy; a third in a soldier thirty-eight years of age, also with a history of epilepsy, tropical service, chronic alcoholism, injury by a fall into the trenches at St. Mary's Barracks, Chatham, and death from paralysis.

The symptoms may extend over several months, and consist in general weakening of the memory and of the intelligence; the occurrence of giddiness; and of continuously intermittent general or local pain in the head. At a later period an aggravation of all these phenomena occurs, with transitory losses of consciousness from the momentary arrest of cerebral circulation. Somnolence and apathy prevail, with weakness, and generally one-sided paralysis of the extremities.

Treatment is more or less expectant. The newly-formed membranes tend to undergo retrograde change, and thus finally disappear. To effect this end is therefore the object of any rational treatment, which must be based on the special history of the individual case, especially as to the previous existence or not of syphilis. *Iodide of potassium*, mercurial inunction by *oleate of mercury*, and *hydrarg. c. cretâ* internally, or *corrosive sublimate*, are indicated as promoters of absorption, with occasional blisters to the scalp. Epileptic or convulsive seizures are best treated by *bromide of potassium* in continuous large doses.

SUNSTROKE.

Natural History.—An affection characterised by vertigo, sometimes with headache, the gradual accession of listlessness and torpidity, with a desire to lie down. These febrile phenomena may culminate in more or less sudden and complete insensibility, without the power of sense or motion, the breathing rapid, and getting more and more noisy as death approaches. Convulsions of the extremities usher in a complete state of coma, in which the patient gradually dies. The approach of death is indicated by the failure of the heart's action, the fluttering of the pulse, the irregularity of the respiration; and the fatal event may supervene within five minutes to a few hours after the disease has become fully expressed. Death is either by *syncope*, *apnœa*, or by a combination of the two. In cases which recover, various sequelæ are apt to supervene, such as forms of paralysis, more or less complete, choreic movements, melancholia, and other forms of insanity.

The disease has been described under a great variety of names—e. g., *heat apoplexy*, *heat asphyxia*, *coup de soleil*, *insolatio*, *ictus solis*, and lastly, *erythismus tropicus*. Notwithstanding that sun heat and the sun's rays have been considered the main agent in producing this disease, it is not less true that the full expression of the disease not unfrequently occurs at midnight. The name implies a common, and certainly a most powerfully exciting cause of a disease which has been variously and erroneously described as of the nature of apoplexy, or of some form of continued fever; and a very great variety of views have been put forward regarding the pathology of this remarkable disease.

The effects of protracted exposure to intense heat in a body of men in the field, debilitated by fatigue and want of rest, are efficient conditions in the production of sunstroke. The effects of protracted exposure to intense heat in a body of men may operate upon them equally deleteriously when in quarters, and are also not less efficient causes of sunstroke.

The characteristic feature with regard to atmospheric temperature, is the little variation of it night or day. In the absence of rain the ground and buildings become so heated that, long after sunset, the radiation of heat maintains a high temperature within doors. Prolonged high atmospheric temperature is recognised as the essential cause of the attack; but nervous depression from solar exposure, fatigue, and previous illness, are associated with that prime or essential cause.

Another most important element of causation is the influence of vitiated air when men are congregated without sufficient ventilation. One-third of the cases, and nearly half the deaths, occurred under such circumstances; so that, in quarters, the predisposing causes of *sunstroke* may be comprised in—(1.) Prolonged atmospheric heat, with a dry and rarefied state of the air; (2.) nervous exhaustion; (3.) a contaminated atmosphere; while (4.) an increase of the average prevailing temperature sufficed to act as the more immediate exciting cause of the development of *sunstroke*.

The symptoms of the disease are thus liable to be greatly modified by accidental causes, and those phenomena which are most prominent under one set of circumstances are either absent altogether under another, or so very much less urgent as scarcely to attract observation—that the disease, in fact, varies in several important points according to the nature of the circumstances in which it occurs.

Generally it may be said that the affection seems gradually induced by protracted exposure to extreme heat in a dry and rarefied air, combined with a vitiated atmosphere from defective ventilation, or with physical exertions of an arduous character, implying excessive fatigue of extreme duration, so as to bring about great debility and weariness of the body. Sleep at last cannot be obtained, or it is greatly interrupted, and of short duration. Deterioration of the general health is thus progressive, while altered looks and loss of flesh indicate extreme exhaustion. The skin becomes rough and scaly, and perspiration ceases. The heat of the surface increases to an intense degree. The bowels tend to become obstinately constipated. The urine becomes copious, and the calls to pass it are frequent; or even incontinence may prevail. Sudden and remarkable elevations of temperature are recorded; for example, a temperature of 104° Fahr. in a fatal case, two and a half hours after admission to hospital; a temperature of 104° Fahr. in a case which recovered; a temperature of 109·22° Fahr. in a fatal case, one hour after admission; a temperature of 109·04° Fahr. in a man fifty-five years of age, who recovered; and a similar record of a man aged forty. One case is said to have reached as high as 113° Fahr. Temperatures of 103°, 104°, and 105° Fahr. are not uncommon a few hours after the attack commences; and cases with temperatures as high as 109·04° Fahr., *ending in recovery*, have been published.

In the cases which terminate favourably a gradual remission of the urgent symptoms takes place; but the irregularity of the heart's action and oppressed breathing may persist during the next day; and if the patient has been exposed to the influence of malaria, paroxysmal febrile phenomena may supervene. The patient cannot be considered free from danger till the skin becomes cool and moist; indeed, a relapse of all the worst phenomena may occur even after free perspiration and sleep have been procured.

Treatment.—Keeping in view the nature of this disease, and the various modes in which death may approach, the line of treatment must be as follows:—When death tends to occur suddenly from *syncope*, there is little opportunity afforded for treatment; but the measures indicated are—the *cold douche*, keeping the surface wet and exposed to a current of air, or assiduously fanned, exclusion of light as far as possible, the immediate employment of stimulants, external and internal, by the rectum as well as by the mouth. *Depletory measures of any kind are not to be thought of.* In the less rapidly decisive cases prompt treatment is of the greatest use; while delay is fraught with the greatest danger. The patient must be immediately stripped of his outer clothing; and, being placed in a semi-recumbent position, the cold douche is to be applied, from a height of three or four feet, over his head and along his spine and chest, his extremities being at the same time sponged over with cold water. Relaxation of the pupil is the first symptom that shews the good effect of the treatment, which may require to be repeated several times, on account of returning insensibility; but if there is any evidence of failure of the pulse, this treatment must be discontinued, and the application of cold to the head is then all that can be borne. Stimulants administered by the rectum may counteract the tendency to prostration. The hair is to be cut short as soon as possible, and a blister applied to the nape of the neck, the surface having previously been well sponged over with the *acetum lyttæ.* When the first violence of the attack is subdued, increasing confidence in the ultimate result may be indulged in so soon as vesication takes place; and in cases where insensibility recurs, after an interval of ten or twelve hours, it may be removed by the application of a second blister to the vertex; which may be again repeated, there being no doubt as to the good effect it produces. A blister may also sometimes be applied along the spine in the worst cases. Stimulation by the use of the electro-galvanic current, with the moist sponges applied along the sides of the neck, chest, and epigastrium, ought also to be employed. *Sinapisms* ought generally to be applied to the extremities, and to the chest or sides.

As soon as possible after the employment of the douche, a strong purgative *enema* ought to be given, those of a stimulant nature being preferred. But as the enema may have to be repeated several times before any effect is produced on the bowels, it may be advisable to let the first enema be of a simple purgative character; and afterwards let it be followed up by *turpentine enemata.*

If cerebral functional disturbance is indicated by the state of the eyes, already described, a *few leeches* to the temples may relieve the congestion; but the prevailing opinion among officers of experience in the treatment of this disease is against the employment of blood-letting by *venesection*, even in severe cases. In all the cases which have been recorded in which it has been employed, it seems to have been generally hurtful, and to have hastened the fatal termination.

In cases where the breathing is much oppressed, and the bronchial tubes loaded with mucus, the patient should be turned occasionally over on his face and side.

In the convulsive form of the disease, where the greatest irritability of the nervous system prevails, the douche is found to be inadmissible, from the agony which it occasions. In such cases Dr. Barclay has seen great benefit from the inhalation of chloroform. After a few inspirations the convulsions for the most part ceased, and sleep was very easily induced; but in one or two instances, after a considerable interval of consciousness, febrile symptoms increased in severity, coma supervened (probably effusion having occurred within the cranium), and was followed by death. But the cases in which chloroform can be used are comparatively few; and very great care is necessary in its employment, so that the inhalation may be suspended at once, as soon as any effect is produced upon the pulse.

In the most severe forms of sunstroke the principle of management is to reduce as quickly as possible the blood-heat. This is best effected by rubbing the body over with ice, as large as can be handled. Tepid body baths, with cold affusion to the head and back of the neck, or general cold affusion, may be employed. Keeping pieces of ice in the axilla is also of use, until there is returning consciousness, which may not be for several hours, and, therefore, great caution is required in such use of ice, so as not to induce gangrene of the skin.

The sequelæ of sunstroke are generally persistent headache, fixed or shifting, pain in the back, choreic movements of the forearm and hand, convulsive disorders, mental weakness. These symptoms are suggestive of *hæmatoma of the dura mater*, as a probable lesion in such cases, and indicate rest, attention to the functions of the skin, and change of air. When the pain is fixed and severe, long-continued counter-irritation at the nape of the neck, and a course of *iodide of potassium* may benefit the patient; but many cases are quite unrelieved by treatment, as the records of the invaliding hospital at Netley shew every year.

Chronic Hydrocephalus.

Natural History.—Effusion of fluid in the sub-arachnoid space, so that the arachnoid becomes a sac filled with serum, or generally distending the ventricles of the brain, and differing from cerebro-spinal fluid in containing more albumen; occurring chiefly among children, and when occurring later in life, generally dating back to childhood. The tissue of the brain in contact with the fluid, especially the commissural parts, are apt to be broken down by œdema into a thin white pulp (hydrocephalic or white softening).

The first thing that strikes us on examining those patients who suffer from the chronic form of hydrocephalus is the enormous *size* of the head. The adult head averages about twenty-two inches in circumference; but in a case of a hydrocephalic child, the head at three months had attained the enormous size of twenty-nine inches in circumference. The head of Cardinal, a celebrated hydrocephalic man about London (long in St. Thomas's Hospital, and who afterwards died at Guy's), measured thirty-three inches and a half. There are instances, however, in which the cranium has been found unusually small, and of a conical shape, the sutures being closed before birth; and in these cases the children are still-born, or die shortly after delivery. When the disease comes on at later periods of life, and after the sutures are closed, the size of the skull is natural, the cavities within the brain distended, and its substance wasted and anæmic.

The membranes of the brain are generally thickened, and the fluid found effused either into the cavity of the arachnoid, into a cyst, or into the ventricles of the brain. When the fluid is contained within the cavity of the arachnoid, the brain is sometimes so compressed that there are instances in which hardly a vestige of that organ remains. A singular and rare variety of this affection occurs when the arachnoid sometimes protrudes through the *fontanelle* or open suture, and the *dura mater* and integuments yielding, a pyramidal bag, with its apex downwards, forms externally, which hangs low down the back like a jelly-bag. When the effused fluid is contained in the ventricles, those cavities are exceedingly dilated. The convolutions have no depressions, but appear unfolded. The *corpus callosum* is much raised, the *septum lucidum* is torn and destroyed, or the *grey commissure* destroyed, and the *white commissure* elongated to the extent of an inch, so that the ventricles communicate. The parts at the base of the brain also, as the *corpora striata* and *thalami optici*, have scarcely any form. In fact, the brain seems expanded into a large sac, in which the medullary and cortical substances are so confounded as to be undistinguishable.

The quantity of fluid contained in the cranium varies from a few ounces to pounds. In the case of Cardinal it was found to exceed ten pints (nine pints in the cavity of the arachnoid, and one pint in the ventricles). Other cases have been, however, recorded in which the quantity has amounted to twenty pints.

Authors have greatly differed as to the nature of this disease. Some, considering it a mere increase of fluid from functional activity, have named it *dropsy of the brain*, most often congenital, and others have as constantly referred it to an inflammatory origin; but they have generally concurred in describing an acute and chronic form of the disease. The symptoms during life are due to the mechanical action of a variable amount of fluid, causing enlargement of the head.

The blood circulation and nutrition of the fundus of the eye also undergo great changes, which may, to some extent, be explained by the compression of the cerebral substance from accumulation of fluid. As the fluid collects and the pressure increases, there occur:—(1.) Greater vascularity of the papilla and choroid, with dilatation of the veins; (2.) An increase in the number of the vessels of the choroid; (3.) Partial or total serous infiltration of the papilla; (4.) Atrophy of the choroid and its vessels; (5.) Atrophy of the optic nerve, which may be complete.

There are two forms of chronic hydrocephalus, the internal and the external, or hydrocephalus in which the membranes protrude. In either case, when this disease is fully formed, whether it be congenital or subsequent to birth, the child is generally of the most feeble intellect, irascible, often epileptic, and of extreme muscular debility, so that, if not palsied, he is hardly able to walk.

Treatment.—*Calomel* in quarter or half-grain doses twice a day; also at the same time inunction of an eighth or a fourth of an ounce of *mild mercurial ointment* or similar inunction of the *oleate of mercury* into the shaven scalp once in twenty-four hours, may be of service in the early period of this disease. The head is to be kept constantly covered with flannel to prevent any check to perspiration. After a lapse of six or eight weeks, diuretics in the form of *acetate of potash*, or *tincture of squills*, or both, are to be given with the mercury. *Counter irritation* by *issues* or *setons* in the neck, which are to be kept open for months, may be useful.

Hygienic measures ought to be of the first importance in the rearing of delicate children, so as to prevent if possible the development of those conditions which lead to effusion of fluid within the cranium.

HYPERTROPHY OF THE BRAIN.

Natural History.—Occasionally it is a congenital lesion in which there is a proliferation of the neuroglia, or connective tissue which unites the nerve elements; or it is developed after birth. It is mainly limited to childhood, and is usually accompanied with cerebral irritation, paralysis, coma, epilepsy, mental imbecility, or other head symptoms—the result of disturbance to the intracranial circulation, from the increase to the contents of the skull, when the fontanelle and sutures are complete before hypertrophy commences.

There is no increase of nerve-tissue elements. The lesion is common in dwarfs. Frequently it develops after birth. It commonly accompanies rickets, with deficient evolution of the thymus gland and hypertrophy of the lymphatics; also syphilis, when the hypertrophy is chiefly of the nature of *lardaceous disease* of the white substance (see p. 44).

The brain, almost exclusively the cerebrum, appears larger and heavier than normal; so that when the calvarium is removed, the brain substance bulges out so much that it is impossible to replace it again. The membranes are thin and bloodless, with no trace of liquid in the subarachnoid space. The cerebral convolutions are flattened and pressed together, so that the sulci between them are obliterated. The ventricles are contracted, the brain tissue bloodless, dry, and elastic. If the lesion is developed early the skull is distended, as in congenital hydrocephalus; otherwise, if the sutures are closed before the lesion commences, the cranial wall is strained by absorption, and the inner table loses its smoothness and becomes rough. If the disease increases rapidly at an early age, the sutures may again open up, and the bones may be pressed apart.

Atrophy of the Brain.

Natural History.—Diminution of brain substance, without induration or softening. The disease is usually congenital, or the consequence of some severe hydrocephalic disease, or of old age, or of long-standing exhausting diseases, especially in children, serum being effused in the space between the brain and its coverings, in order to supply the deficiency of bulk. Sometimes also one side may be more atrophied than another; the membranes appearing to be greatly shrivelled after the fluids escape; the convolutions are thin, and the sulci wide. The sufferers are generally idiotic, and possess but little use of their limbs.

True atrophy of the brain consists in a diminution of the size or number of the brain elements, without a previous destruction of them, or shrinking of cicatricial-like tissue. Two forms are to be distinguished—(1.) Incomplete development, or congenital deficiency. (2.) Retrogression, or disappearance of brain elements. In the first form the development may be so incomplete that either there is perfect idiocy or life cannot be maintained. There occurs also during fœtal life and the first year of childhood, an arrest of growth on one side—the opposite side continuing to grow. Such cases may live and attain a certain degree of mental development. After the development of the brain is complete, atrophy may set in primarily as *senile marasmus*, or it may be a result of exhausting and wasting diseases. Local disease in the brain is also a cause of secondary atrophy, such as the lesions of *apoplexy*, *softening*, or *encephalitis*.

Weakness of intellect or decided idiocy are the usual accompaniments of atrophy. The organs of special sense, especially the eye, are very obtuse, and the peripheral nerves over the paralysed half of the body are diminished. Paralysis and atrophy of the body on the side opposite the atrophied hemisphere are usual symptoms of the lesion. Paralysis is generally complete and combined with contractions of tendons. The bones are atrophied as well as other parts. Epilepsy is usual, and although the disease is not of itself fatal, intercurrent lesions usually very readily cause death.

Tumors of the Brain and its Membranes.

Natural History.—New growths, parasites, and aneurisms, implicating the central substance, the membranes of the brain, or both, also different forms of tumor occurring in the brain, have been described under the following names:—(a.) *Simple cerebral tumor* (*scleroma*), or indurated portions of the brain; (b.) *Gliomata;* (c.) *Adenoid sarcomata*, or fleshy tumors; (d.) *Strumous tumor*, tubercular deposits (*tyroma*); (e.) *Gelatiniform tumors* (*myxomata*, *colloma*); (f.) *Adipose* and lardaceous tumors (*lipoma*); (g.) *Cholesteatma*, or pearl-like tumors; (h.) *Encysted tumors;* (1.) *Cysticerci and echinococci;* (2.) *Blood-cyst* (*hæmatoma*); (i.) *Fungoid tumor;* (k.) *Melanotic cyst;* (l.) *Cancers;* (m.) *Syphilomata;* (n.) *Aneurisms* (CRAIGIE, ROKITANSKY, VIRCHOW, NIEMEYER).

The origin and progress of these tumors are very obscure.

(*a.*) *The simple cerebral tumor* takes the form of an induration, or *scleroma*, of particular regions of the brain. There is an absence of red colour, and the part acquires the consistence of the white of egg boiled hard.

(*b.*) *Gliomata* result from proliferation of the *neuroglia*, or connective tissue; and as it grows up into a tumor, the surrounding or implicated nervous elements become destroyed. Microscopically they consist of roundish nuclei, distributed throughout a finely reticulated basement substance. They do not appear to form circumscribed tumors, but gradually to pass into healthy tissue. They are never seen to pass from the central substance to the membranes, and they generally originate amongst the medullary substance of the cerebrum. They may attain the size of one's fist, and are liable to hæmorrhagic exudations and fatty degeneration. In consistence they are between medullary cancer and healthy brain. On section they are seen to vary in colour from a whitish-yellow to a bright-grey red, and abound in cut vessels. Such tumors have often been taken for cancers; and they usually occur under the fortieth year of life.

(*c.*) *Adenoid sarcomata* or *fleshy tumors* resemble a mass of flesh or enlarged lymphatic gland, of a light pink or pale flesh colour, of considerable firmness, and sometimes attaining the size of a large apple. They are usually attached to, and seem to proceed from the meninges, although they are for the most part embedded in the cerebrum. Sometimes they contain cavities filled with fluid. Microscopically they are seen to consist of spindle-shaped cells, arranged in fibrous-like striæ. They differ from cancer in being sharply bounded, and often enclosed in a vascular membrane, from which they can be turned out. They are liable to calcareous degeneration.

(*d.*) *Strumous tumors, as tubercles of the brain*, or *tyroma*, are the most frequent form of cerebral tumors. They are composed of matter of a white or pale yellow colour, firm, like soft cheese, but less tough, granular, and friable. The growth occurs in various forms:—

(1.) As one to four, five, or six homogeneous masses of considerable size, from that of a pea to a walnut, always without blood-vessels or trace of organic structure.

(2.) Numerous (30, 40, to 200) minute spherical masses disseminated through the substance of the brain, and located most frequently in the *cerebellum* or *cerebrum;* more rarely in the *central ganglia.* They are generally surrounded by loose connective tissue, and on section may disclose softening at the centre, to the extent of a vomica containing tubercular pus; or the centre is marked by dark discoloration. Sometimes the main portion of the tumor passes gradually into the brain structure by a slightly translucent exudation, consisting of young tubercle elements. Such exudation indicates that growth is still going on, that scrofula is in the act of tubercle formation.

(*e.*) *Gelatiniform tumors*, *colloids*, or *myxomata*, are growths of a peculiar soft jelly-like translucent material, like thin glue. Microscopically they are composed of variously formed cells, embedded in a mucous hyaline substance. They are found most frequently in the medullary substance of the cerebrum. They are liable to undergo blood extravasation. The earliest indications of the lesion are epileptic seizures and loss of memory.

(*f.*) *Adipose*, *lardaceous tumors*, or *lipoma*, are usually small, nodulated, and solid, attached to the dura mater; or they are cysts enclosing hairs, fat, or oily fluid, with excrescences from the inner walls of the cyst.

(*g.*) *Cholesteatoma*, *pearl-like* or *margaroid tumors*, consist of white glistening globular masses like pearls, each mass varying in magnitude from the size of vetches to peas. The colour is of a dead silvery, pearly, or waxy grey, and the aggregation of those forms tumors varying in size from a nut or walnut to a small pippin apple. The mass is generally irregular and elongated. They are situated mostly on the base of the brain, or lower surface of the cerebellum, in the subarachnoid areolar tissue, between the *arachnoid* and the *pia mater.* They sometimes grow from the cranial bones or meninges; but shew no trace of organic structure, and chemically consist of cholestrine, with concrete layers of epidermic cells, enclosed in a delicate membrane.

(*h.*) *Encysted tumors* are chiefly of two kinds,—one kind owning a parasitic source. The parasites are always immature—transition stages of tape-worm parasites—such as the *cysticerci* or *echinococci.*

The *cysticerci* are usually found in large numbers, and generally in the grey substance. Occasionally they have commenced to undergo degeneration (calcareous), but the hooks can generally be recognised.

Echinococci or hydatid tumors, watery bags, have been long known as existing in the brain. They form large vesicles, enclosed by their delicate germinal membrane, and characteristic albuminoid cyst.

Blood cyst or hæmatoma has been already described (page 278 *ante*).

(*l.*) *Cancers*, in the form of medullary fungus hæmatodes, or scirrhus, are similar in the brain to their structure elsewhere, already described.

They sometimes grow from the brain itself, from the *dura mater*, or the cranial bones; or, commencing in the external soft parts of the skull and neighbouring cavities, especially the orbit, they infiltrate by the vessels and nerve-sheaths, and so press into the skull. Although it is rare for cancers commencing inside to penetrate the membranes and skull bones, yet such growths frequently make their way outwards, and protrude through the orbit, when they at once commence to soften and ulcerate. Such tumors often commence symmetrically.

(*m.*) *Syphilomata* occur in the brain as in other parts, as *gummata* or nodes, or as diffuse infiltrations.

(*n.*) *Aneurisms* of the cerebral arteries form tumors generally at the base of the brain, in connection with the blood-vessels there, especially the *basilar arteries*, those of the *corpus callosum*, and the *Sylvian fissure*, and the communicating artery of the *circle of Willis*. Usually they are about the size of a pea or a hazel nut, but sometimes are larger before they rupture.

The symptoms of tumors are not characteristic as distinguished from *softening*, *abscess*, or local lesions, already described. All agree in producing certain common changes in the contiguous cerebral substance; and all of them tend to some extent to derange the capillary circulation of the brain and its membranes, and to that extent they tend to produce cerebral symptoms and cerebral irritation. The greater the vascularity and congestion of the tumor, the greater will be the infiltration of the whole brain by serum. In connection with the membranes, excitement and congestion of the pia mater and grey substance of the hemispheres are attended with peculiar psychical phenomena, and often by the symptom of effusion into the ventricles.

Chronic headache and epileptiform attacks are the most common accompaniments of cerebral tumors; and when the vascular excitement of tumor and brain is at the greatest, then loss of memory, impairment of intellect, convulsions, or palsy are the results.

If the growth of the tumor is slow, and its size small, little influence may be exercised on the general functions of the brain; but according to its *locale* will certain special indications occur.

If the tumor affect the integrity of the *anterior* lobes of the brain, more or less loss of speech (*aphasia*) will be the result, depending either on disorder or abolition of memory, or on that of the muscular motions of the organs of speech.

If the tumor affects the anterior part of the *central ganglia* (*corpus striatum*), the motions of the legs may be disordered or impaired.

But there is an utter absence of constant symptoms pathognomonic of tumors of the brain; and the diagnosis must be made (*a.*) from the history of the case; (*b.*) the physiological phenomena indicating the location of lesion at a point where tumors are known to be common, and other lesions rare; (*c.*) from peculiarities in the course of the disease.

Treatment.—Under these circumstances medicinal treatment can be of no avail; but the patient may be protected as much as possible from hyperæmia of the brain aggravating the morbid state. His nutrition and mode of life must be regulated, and also the functions of the bowels. Apoplectic or local inflammatory attacks may be met by local blood-letting and cold compresses. Hypodermic injections of morphia are also to be used in suitable cases. If syphilis exists, or is suspected, antisyphilitic remedies are at once to be adopted.

SECTION IV.—DETAILED DESCRIPTION OF THE DISEASES OF THE SPINAL CORD AND ITS MEMBRANES.

INFLAMMATION.

Natural History.—Two varieties of inflammation of the substance of the cord, or of its membranes, or of both, are to be recognised more easily after death than during life, namely:—(*a.*) *Spinal meningitis;* and (*b.*) *Myelitis.*

(*a.*) SPINAL MENINGITIS.

Natural History.—Inflammation of the membranes of the spinal cord, and the morbid effects so produced, are similar to those of inflammation of the membranes of the brain. Spinal meningitis probably never occurs as an independent disease; but usually from injury, caries of the vertebræ, exposure to cold or wet, great heat applied directly over the spine, as sitting with the back before a great fire, syphilis or gout, or the extension of cerebral meningitis to the coverings of the cord.

The rachidian *dura mater* may be inflamed either at its free or at its adherent surface. The symptoms of *rachidian arachnitis*, or *meningitis* of the cord, are often obscure at the commencement; but once formed, the disease is characterised by pains in the back, increased on movement of the spine, with painful spasmodic affections of the muscles, and retention of urine, or irritability of the bladder. Paralysis may occur from pressure produced by exudation of fluid, or by extension of inflammation and disorganisation of the cord itself. One marked symptom of congestion of the membranes is the difficulty experienced in walking on first arising after a night's rest. I have observed this to be a constant indication of spinal congestion; and it may be temporarily induced by *strychnine* or *nux vomica.* The affection of the muscles varies from simple stiffness of the part to *opisthotonos.* This latter symptom is often limited to the neck or trunk, without the limbs participating, the trunk and neck being drawn backwards, while the patient walks freely till the time of his death.

Treatment.—Spinal meningitis, seldom depending on a morbid poison, is perhaps in all cases best treated by local bleeding and mild purgatives. *Bleeding*, either by cupping or leeches, along the vertebral column, is most useful, and ought not to be omitted. Moderate purging by the neutral salts, as the *sulphate of soda* or the *sulphate of magnesia*, is probably the best medicinal remedy. But whatever purgative may be selected, it will be proper to combine it with the *tincture of hyoscyamus*, or other mild opiate, to procure the patient some relief from his sufferings. Ergot of rye (*secale cornutum*) has been very much used in France. Dr. Meryon speaks favourably of its effects, combined with *iodide of potassium*, in a case which manifested no complication of spinal effusion. The warm bath is an excellent adjuvant in the earlier stages of the disease; whilst in the later stages *blisters*, *setons*, *moxæ*, or the *ointment of the tartrate of antimony*, are more beneficial. The paralysing effusion may disappear during their use, combined with the action of *diuretics.* The *external* application of *belladonna* and *chloroform*, and internal administration of *croton chloral* will be found of service in diminishing the violent pain which accompanies meningitis of the cord.

(*b.*) MYELITIS.

Natural History.—Inflammation of the cord may be diffuse, and may terminate fatally, either—(1.) In the *acute inflammatory stage;* (2.) by *ramollissement;* (3.) by *undefined suppuration;* or (4.) by *abscess.*

The most common affection, however, is ramollissement, in which the substance of the cord is greatly broken down and softened, so as to be sometimes reduced to a mere pulp, or so diffluent as to give the sensation of fluctuation under the finger. This disorganisation may embrace the whole thickness of the cord, or sometimes only one of its columns; and the centre or *grey* substance is more softened than that of the circumference or white substance. The ramollissement may exist in the cervical, dorsal, or lumbar portions; but it is most common in the lumbar, and after that in the cervical portions, or in those parts which contain the greatest quantity of *grey* substance, and the greatest number of blood-vessels. The part affected is generally swollen—a circumstance more striking than in similar diseases of the brain, because the spinal canal is large in proportion to its contents, compared with the cranium. The softened part is also generally ash-coloured or white. Some pathologists have regarded ramollissement of the cord as a particular alteration of the nervous system, resembling the effects of a contusion of soft parts, and the result of shock. It often occurs, however, when no shock has been received, and has not the least resemblance to a contusion of soft parts.

The symptoms of *myelitis* are in general limited to the functions of parts below the lesion. In a few cases, however, the effects of the lesion are reflected from below upwards. In general, both upper or both lower limbs are affected; and in few instances only one limb. The earliest symptoms are recognised in the fingers and toes, by a feeling of numbness, with a sensation of coldness extending up the limb. Shortly afterwards the patient complains of pain in the back, corresponding to the seat of greatest intensity of inflammation. This is not constant; but when we make pressure with the finger over the spinous processes of the affected part, it is augmented or only then felt; also when a hot sponge or an ice cold one is applied. These symptoms are succeeded by impaired motion, and often likewise by diminished sensation of one or more limbs, followed by paraplegia or other form of palsy. If only one side of the cord be affected, the paralysis which results is confined to one side of the body. When the anterior columns chiefly are the seat of the inflammation, the paralysis which follows is that of muscular motion, but of sensation if the lesion exist in the posterior columns; and if a careful analysis be made of the several cases in which the grey substance of the cord has been implicated, it will be found that the function of reflex action has been deranged. In the early stage, when congestion prevails, there is exaltation of tactile sense and of muscular contraction. Another marked symptom may be often distinguished—namely, a difficulty experienced in walking on first rising after a night's rest—a feature more or less constant in cases of spinal congestion. The palsied limbs may be either relaxed or permanently contracted: thus, the hand may be bent on the upper arm, or a leg be flexed upon the thigh, or the affected limb may be attacked with convulsive twitchings, or may beat incessantly. As the disease advances, the bladder becomes affected, and the patient is incapable of retaining his urine, from the sphincters being palsied. The action of the bowels is slow in the first instance; but towards the close of the disease the patient may be purged, and the stools pass involuntarily. If the disease be the result of an accident, the pulse is at first rapid and full; but if the disease be spontaneous, the pulse is generally natural, until the powers of life are broken down by the continuance of the affection. As death approaches, the nates and the prominent parts of the pelvic region, on which the body rests, ulcerate extensively, so that deep sloughs form; and although the patient, from anæsthesia, may suffer no pain, he nevertheless ultimately sinks exhausted.

In *myelitis*, and in injuries of the spine from wounds and contusions, some differences in the symptoms have been observed, according to the seat of the injury. Every part of the body which receives its nerves from the spinal cord below the upper level of the structural disorganisation is paralysed; consequently, when destructive *myelitis* extends throughout the cord to the *fifth* pair of cervical nerves, the upper extremities are paralysed, and all those parts which receive their nerve-power from a lower level of the cord are paralysed too. If, again, the spinal cord be lacerated or divided above the origin of the *phrenic* nerves, or above the *third* cervical vertebra, death is the immediate consequence, the nervous influence being no longer transmitted with sufficient completeness to the diaphragm and other muscles of respiration.

When the injury, however, is below the origin of the *phrenic* nerves, or at the level of the *fifth* and *sixth* cervical vertebræ, the inspiration is free, but the expiration is laborious, for the intercostal and abdominal muscles are paralysed, and incapable of assisting in that process. The patient can yawn, for that is an act accompanied by inspiration; but he cannot sneeze, for that is an act accompanied by expiration. At this point, also, the upper extremities are still palsied, both as relates to motion and to sensation. When the palsy of motion and of sensation is complete, the patient, during the short remaining period of his life, presents the extraordinary phenomena of a living head, with its sensibility and muscular powers unimpaired, attached to a trunk and extremities of whose existence he is only conscious by the sense of sight. The circulation of the blood is affected, and the action of the iris of both eyes, through the medium of the sympathetic nerves. Another very common symptom connected with injuries of the upper portion of the cord is *priapism*, which may shew itself about the second or third day after the accident, and generally subsides after the first fortnight. It sometimes occurs even when all sensation in the part itself is destroyed, so that the patient is not sensible of the introduction of the catheter.

Treatment.—It may be laid down as a general rule that *bleeding* ought not to be had recourse to after palsy has occurred; and it may be stated that so long as the affected muscles are convulsed, rigid, and irritable, the use of *antiphlogistics* and *counter-irritants* is indicated; but when the means calculated to subdue excitation have failed to arrest the further progress of the disease, and paralysis supervenes, stimulants are the only remedies which restore to functional activity those nerve cells and conducting fibres which are not irretrievably destroyed. Antiphlogistic remedies acting on the alimentary canal so as to produce three or four motions in the twenty-four hours, create such a derivation as in some degree relieves the parts. Of all stimulant local remedies, *electricity* and *strychnine* are the most potent and the best; and *secale cornutum* has been recommended as a remedy possessing the same power as *strychnine.* When there is no great pressure beyond that which simple congestion produces, nor actual disorganisation of the spinal cord, the remedial power of *secale cornutum* is in some cases very great. It seems especially to resuscitate the muscular contractility of the rectum and bladder, and pelvic viscera generally. It is best given in the form of *ethereal tincture*, in doses of from ten to twenty drops twice or three times a day. It does not relieve the reflex convulsions, which are sometimes alleviated by *prussic acid*, *digitalis*, or *belladonna*, *chlorodyne*, *chloro-morphine* or *croton chloral.*

After the local pain in the back has been subdued, no remedy is so effectual as *strychnia*, in the dose of one-twentieth of a grain, repeated more or less frequently (twice or three times a day) according to the evidence of its action. It may be combined advantageously with *ipecacuanha* in cases where the intestinal mucus seems deficient. The absence of pain and of spasmodic muscular contraction necessitates great caution in determining the precise moment when the spinal cord is likely to be benefited by the energetic excitement of *strychnia.* The internal administration of this remedy ought, therefore, to be always preceded by its external use, together with other stimulants in the form of embrocations over the spine, when the stage of excitation has been subdued. *Electricity*, after the activity of inflammation has been subdued, is a therapeutic agent of great value; and the continuous current of galvanic electricity seems to be as efficacious as the induction or intermittent current. But whether *galvanism* or *electro-magnetism* be employed, no high degree of tension is required for the restoration of muscular power; on the contrary, the favourable course of many a case has been retarded by the employment of strong currents.

In cases with a history of syphilis, and where there may be some reason to believe that hardening or induration of the cord or its membranes has taken place, the *iodide of potassium* may relieve the early phenomena, and by the aid of *setons*, the progress of the disease may be held in abeyance so long as the discharge is maintained from the *seton.*

When disorganisation of the spinal cord has become an accomplished fact, the disease is incurable; but yet the exigencies of the patient are not the less pressing on the careful attention of the physician, and in nothing more so than in the protection which is called for against bedsores, which will sometimes occur in spite of the greatest care.

SPINAL HÆMORRHAGE—*Syn.*, SPINAL APOPLEXY.

Natural History.—Hæmorrhage of the spinal marrow or of its coverings occurs usually as small ecchymoses, accompanying excessive hyperæmia, usually traceable to injuries of the spinal meninges. In some cases such hæmorrhages are the result of chronic degeneration of the cord. Extravasations of blood from meningeal hæmorrhage of the cord are found chiefly in the lower part of the spinal canal, and often fill the subarachnoid space; and the changes undergone, alike by the cord substance and the blood clot, are similar to those described as going on in the encephalon.

Effusions between the meninges give rise to severe irritation, pains in the back, and spasms, especially in the parts supplied by the nerves going off below the seat of injury, and ending in paralysis. Perfect anæsthesia and complete paralysis accompany large extravasations; so that it depends upon the position of the hæmorrhage—high up or low down—whether the paralysis will be more or less soon fatal.

If the symptoms of interrupted nerve conduction from the brain are sudden—anæsthesia and loss of voluntary motion in the lower half of the body, combined with paralysis of the bladder—then it is most probable the cause is rather hæmorrhage than inflammatory softening; and in other respects, what has been written regarding *spinal meningitis* and *myelitis* can only be repeated here.

SECTION V.—DISEASES OF THE NERVES.

PARALYSIS.

Natural History.—Palsy or paralysis are terms commonly restricted to affections where voluntary motion is lost, in which the motor fibres are no longer acted upon by volition (*acinesis*, from α privative, and κινησις, motion), while the term anæsthesia implies a palsy of the nerves of sensation. The various forms of palsy, or paralysis, are rather symptoms of a lesion than specific diseases. Palsy of a part is a very constant symptom of structural disease of the brain or of the spinal cord, but it occasionally occurs from a diseased state of a nerve-trunk itself. Palsy may affect a whole limb, or merely a part of one, and it is also limited to the muscles of certain regions. Palsy of a finger, a hand, an arm, or a leg, is an example of the first; palsy of the facial muscles of expression, from disease connected with the *portio dura* of the seventh pair, or facial nerve, is an example of the second.

The following conditions give rise to paralysis of motion:—(1.) Lesion of a nerve in some part of its course destroying its power of transmitting that force, which is expressed by a contraction of the muscle into which the nerve is distributed. (2.) A lesion of some portion of those central parts of the nervous system whence the nerve takes its origin, or with which it may be connected directly or indirectly. And whatever interferes materially with the conducting power of nerve-fibre, or the generating power of nerve-vesicle, will constitute a paralysing lesion. Poisoning of the nervous matter will operate in this way. *Chloroform*, *ether*, *opium*, the poison of *lead* and of *mercury*, applied directly to the nerve-fibre of a living animal, suspends its power of transmitting the nervous force so long as the influence of the poison lasts. Poisons formed or retained in the living body operate in the same way, such as the retained *urinary* or *biliary* principles, as in *Bright's disease*, the poisons of *rheumatism*, *gout*, and probably also *syphilis* in some of its more severe tertiary effects. Whatever, in short, impairs the natural structure of the nerve-matter, such as *inflammation*, *atrophy*, *condensation*, *softening* (spinal, as in the form of *tabes dorsalis*), *solution of continuity*, either by simply cutting the trunk of a nerve, or by the deliquescence of the nerve-fibres, as a result of disease, such as *white softening*, a *sanguineous* (*spinal apoplexy*) or *serous effusion*, *pressure on a nerve or a nervous centre*, are causes which will produce more or less complete paralysis of motion.

Four different conditions of the muscles are to be observed in cases of paralysis, namely,—(1.) A condition little different from that of health, but less firm, less excitable by the galvanic stimulus, when the paralysing lesion is not of an irritative kind. (2.) Complete relaxation of the muscles, characterised by softness, imperfect nourishment, and rapid wasting—so rapid, that in a few days the size of the limb experiences a marked diminution. Such muscles scarcely, if at all, respond to the galvanic stimulus. (3.) Contraction of the muscles, with rigidity and wasting (the flexors being always more rigid than the extensors)—a condition which is due to a chronic shortening of the muscles themselves, and generally associated with a form of muscular atrophy. (4.) Nutrition not impaired, constant firmness and rigidity, incomplete paralysis, and with increased susceptibility to galvanic stimulus.

The practical inferences to be drawn from these conditions are of great value in treatment. Thus, early rigidity and its continuance indicate local bleeding or counter-irritation, while complete relaxation is against antiphlogistic treatment.

The different forms of paralysis of common occurrence are due—(1.) To disease of the brain or spinal cord, in which form the muscles may be rigid or relaxed, the disease of the brain being the result of *apoplexy*, *minute hæmorrhages*, *softening*, *renal disease*, *induration*—the result of *syphilitic poison;*—the *epileptic* or *choreic* state; (2.) To pressure upon or injury to a nerve; (3.) To hysteria; (4.) To the influence of poisons, such as *lead*, *arsenic*, *mercury*, and some kinds of food-grains in a diseased state, such as *lathyrus sativus*.

Typical forms of paralysis are represented by:—

(1.) *Paralysis of the insane*, or *general paralysis* (see under Disorders of the Intellect); (2.) *hemiplegia;* (3.) *paraplegia;* (4.) *locomotor ataxy;* (5.) *wasting palsy*, or *progressive forms of paralysis;* (6.) *infantile paralysis;* (7.) *local paralysis*—e. g., (*a.*) *facial palsy*, and (*b.*) *Scrivener's palsy;* (8.) *paralysis from blood-poisons;* (9.) *paralysis from lead-poisoning*, or other poisons in food or drink, or from specific disease, such as *diphtheritic paralysis;* (10.) *paralysis from lathyrus sativus.*

HEMIPLEGIA.

Natural History.—A form of paralysis affecting one lateral half of the body—*unilateral paralysis.* It is that form of palsy to which the name of "*paralytic stroke*" is commonly applied, and indicates organic lesion in that cerebral hemisphere *opposite* the side which is paralysed. Either lateral half of the body may be affected; and the parts which are actually involved are generally an upper and lower extremity, the muscles of mastication, and the muscles of the tongue on one side. The paralysis may be either complete or incomplete as regards motor power. Consciousness may or may not be perfectly retained; and whether it is so or not, the patient, when seized, falls to the ground, because the power of maintaining his equilibrium is destroyed by the failure of the antagonising muscles of one-half of the body. The affected arm and leg lie as if lifeless by the side, all power of motion in them being destroyed, the leg resting on its outer aspect, with the toes everted. Stimulation, however, of the extremities of the sentient nerves, by slight titillation with the fingers, sometimes gives rise to active movements, which cause considerable pain. These excited motions, to which the name of "*reflex actions*" has been given, occur almost exclusively in the lower extremities. Other involuntary movements of the paralysed limbs occur simultaneously with the action of yawning, or result from emotions of surprise, joy, pleasure, grief, laughter, crying. If the hemiplegia is not so severe as to prevent walking, the attitude and gait are characteristic. The patient leans to the sound side, and generally carries the helpless arm supported in the opposite hand; the leg in walking is swung outwards by a sweep of the whole limb from the hip-joint, the toes drooping downwards as the foot leaves the ground. When the *fifth* nerve is implicated in the hemiplegia, the proper masticatory movements are unequal on the two sides, in consequence of paralysis of the temporal, masseter, and pterygoid of the affected side. There is a want of force in the masseter muscles of the paralysed side; and there is therefore apt to be lateral displacement or obliquity of the inferior maxilla, either when at rest or during mastication. The mesial line between the lower incisors is thus also apt not to correspond to that in the upper jaw.

Sometimes the *third* nerve may be paralysed, in which case the upper eyelid drops, and there is inability to raise it, combined with outward squint and dilated pupil.

The protrusion of the tongue is also characteristic in hemiplegia. It is pushed out towards the side affected, and on being retracted it is drawn towards the healthy side. Imperfect articulation exists, and results from the palsy of the *ninth* and *fifth nerve;* and where the power of speech is wholly lost (most usually in paralysis of the right side) or utterance is limited to monosyllables, the sign is not favourable, but denotes, with other symptoms, extensive lesion of the (left) brain, superficial as well as deep. (See page 245, *ante*). When deglutition is impaired, serious and extensive lesion of the brain, connected with the *vagus* or *glosso-pharyngeal nerve*, is denoted.

In all forms of hemiplegia the paralysis is a paralysis of motion more or less complete. In general, however, sensation is also more or less impaired. In estimating the condition of the sentient functions, the same method is to be adopted which Weber devised in comparing the sensibility of the surface of the skin in different parts of the body. It consists in ascertaining how near the sharp points of a pair of compasses may be approximated, and yet be distinctly felt as two points by the patient. (See pages 239 to 242, *ante*.)

Treatment.—The object to be aimed at in the early treatment of hemiplegia is to keep down the frequency and force of the heart's action. For this purpose strict maintenance of the horizontal position is necessary; and when consciousness exists, let the mind be kept tranquil by every means. Remove any local impediment to the easy flow of blood, and let the head be slightly raised, sufficient to prevent gravitation favouring the escape of blood from the ruptured vessels, but not so as to create any impediment to the flow, and so embarrass the action of the heart. Let the bowels be cleared out, so that no irritation from them may operate injuriously on the brain. In so doing, *enemata* ought to be employed; and failing these, *castor oil* or *calomel*, with *compound jalap powder*, may effect an efficient evacuation.

With regard to *blood-letting*, there are three objects to be attained, —(1.) To diminish an undue amount of blood to the head; (2.) to check hæmorrhage, or to prevent it; and (3.) to quiet the action of the heart. The circumstances under which its use is *inadmissible* are the following:—If the patient be cold and collapsed; if the heart's action be feeble and intermittent; if there be an anæmic state; if the patient be of advanced age; if there is evidence of extensive disease of the arterial system or of the heart; or, lastly, if it can be ascertained that already a large amount of hæmorrhage has taken place into the brain;—these, singly or conjointly, are reasons why bleeding *ought* NOT *to be resorted to.* If none of these objections exist, it is to be considered whether any of the three indications noticed require to be fulfilled, and whether they can be best fulfilled by local or general blood-letting. Rigidity of the muscles, coming on very early, indicates an inflammatory process going on round the clot, and is to be combated by urinary and alvine evacuants, and by counter-irritation. It is not desirable to interfere in the *later* forms of muscular rigidity. Time is an important element in the cure. With regard to the use of expedients for promoting the restoration of the paralysed limbs to their normal conditions, nothing is of more decided benefit than a regulated system of exercise—active when the patient is capable of it, passive when he is not—by systematic motion of joints. A *hot or cold douche* may also be useful. The applications should be continued two or three minutes, and continued daily for some time. Friction with flesh-brushes, gloves, or the hand merely, should also be persevered with daily.

To prevent atrophy of paralysed limbs, to improve their nutrition, and stimulate feeble circulation, the application of *Faradisation* and the *interrupted galvanic currents* are recommended. The current should never be so strong as to cause pain. It will not further improve motion beyond restoring muscles to a condition of normal contractility. When œdema of the limbs exists, *a warm bath* to the part every night is of service. The bowels must be kept open; and if anodynes are required, *opium* should be avoided, and *hyoscyamus*, *conium*, *Indian hemp*, or *croton chloral* should be used instead.

PARAPLEGIA.

Natural History.—A form of paralysis affecting the lower half of the body, in which both legs, and perhaps also some of the muscles of the bladder and rectum, are paralysed. Of this kind of paralysis there are at least two forms, which differ as to their mode of origin—namely, *reflex paraplegia;* and *paraplegia due to myelitis in some one of its numerous forms*, the result of injury or of disease.

Reflex paraplegia or *reflex paralysis* are terms which indicate *paralysis from peripheral irritation*—a paralysis uniformly associated with injuries or disease of parts or organs remote, and not directly continuous with the nerves from the spinal marrow.

Forms of paralysis due to reflex action are—(1.) *Emotional paralysis;* (2.) *pregnancy* and *uterine* affections, as from *dysmenorrhœa*, or *metritis*, are apt to induce such *reflex paraplegia*, or sometimes *hemiplegia* or *amaurosis;* (3.) *neurolytic paralysis*, in which, from no adequate cause, the functions of the cord seem suspended for a time, associated generally with exposure to cold and wet; (4.) paralysis from the *irritation of worms* in the intestinal canal; (5.) paralysis from the *irritation of teething* in children; (6.) *urinary paralysis;* (7.) *mechanical injury* of one part may give rise to reflex paralysis in another part, as in some cases of gunshot wounds:—as when (*a*) A wound involving the muscles of the right thigh is followed by reflex paralysis of the right arm and left leg; (*b*) a wound of the right thigh, followed by paralysis of right arm; but in all, however great the loss of motion or sensation at first, the power of movement and sensation begins to return early, and continues to improve till the part has nearly recovered all its normal powers; and in nearly all, some amount of paralysis continues permanent, or the part remains weak.

It is necessary, therefore, to look for some primary disease to account for *reflex paraplegia*, believing at the same time that such primary disease may ultimately establish a myelitis, while a diagnosis of *reflex paraplegia* is mainly based on a contrast of the phenomena which attend the various forms of paraplegia due to other causes.

Treatment.—In cases of *reflex paralysis* means must be taken—1st.

To diminish the peripheral irritation which causes the paralysis; 2d. to improve the nutrition of the spinal cord; 3d. to prevent the ill effects of rest on the paralysed nerves and muscles.

In cases of disease of the urethra or prostate, an injection of a solution of one grain of the *extract of belladonna*, in twenty drops of *laudanum*, is to be made into the urethra, and the injection should be retained for half an hour, or even an hour, after which some emollient decoction should be used, such as *linseed tea*, to wash out the passage. Every two or three days this operation should be repeated. If the bladder be diseased, a solution of one grain of the *extract of belladonna*, in twenty drops of *laudanum*, may be used as an injection, after a complete emission of urine. Injections of carbolic acid arê also of use in counteracting decomposition of urine and epithelium in the bladder. If the prostate is enlarged, a suppository ought to be put at times into the rectum. One of the best suppositories for this purpose is composed of the following ingredients, namely:—*White sugar*, *white soap*, *and gum-arabic* in powder, of each three grains; *opium*, in powder, a grain and a half; or *belladonna extract*, one grain; or both combined. These being mixed together, the mass is to be formed into a conical shape, and being dipped in melted wax, is ready to be introduced when required into the rectum. When the irritation causing reflex paraplegia starts from the vagina or uterus, a pill of half a grain of the extract of *belladonna*, with a grain of *opium*, surrounded by a piece of cotton wool, is to be introduced into the vagina, and made to surround the neck of the womb. By means of a thread attached to the wool it may be withdrawn so soon as the pain ceases or diminishes. *Opium*, combined with *strychnia*, is of greater use in reflex paralysis; and of all remedies, *strychnia* is best suited for promoting the second indication, which points to increasing the nutrition of the spinal cord. The dose combined with opium must be a small one—namely, *one-fortieth* to *one-thirtieth of a grain daily;* when used alone, its dose may be *one-twentieth of a grain;* and when employed together with *belladonna*, its dose must be still larger. In cases where no congestion nor inflammation of the spinal cord exists, *strychnia* ought to be persistently employed; but its use ought to be suspended at once whenever it produces spasms, or even numbness of the feet in getting out of bed in the morning. *Sulphur baths* are also productive of benefit.

The third indication—namely, to prevent the ill effects of rest on the paralysed nerves and muscles—is best met by the employment of *galvanism*, if there is atrophy, and shampooing of the paralysed limbs; if no wasting exists, *Faradisation* is to be used until the muscles act easily under its use. Two or three applications, of ten minutes each, in a week, are sufficient; but if no sign of contractility is observed after a week, it will not do any good.

Locomotor Ataxy.

Natural History.—A peculiar form of apparent paralysis, characterised by unsteady and disorderly muscular movements, but with muscular power entire, and more or less progressive loss of the faculty of co-ordinating power (voluntary and instinctive). There is sometimes temporary diplopia, with unequal contraction of the pupils. The course of the disease is slowly progressive; and the anatomical lesion is generally a degeneration of the posterior columns and horns of the spinal cord and posterior roots of the spinal nerves; sometimes with peripheral structure-change in the cranial nerves, chiefly the second, third, and sixth pairs, in cases where the sight is affected, and, exceptionally, in those of the extremities.

The disease is one of middle life; most common in the prime of life, between thirty-five and fifty years of age; it is very rare in youth or old age. It is also more frequent, in a very large proportion, in males than females. It has received various names, some suggestive of its progressive nature from bad to worse, such as *Progressive locomotor ataxy; Progressive motorial asynergia; Consumption of the spinal cord; Tabes dorsalis, grey degeneration of the posterior columns of the spinal cord.*

The disease is a peculiar one of the nervous system, commencing insidiously with evidence of disorder of some of the *cranial* nerves, perversion of sensibility in different parts of the body, ultimately giving place to inco-ordination of motion—always associated with degeneration of the posterior columns of the spinal cord and posterior nerve-roots, but without loss of muscular power or impairment of the intellect. The connecting links between the initial disorders of the cranial nerves (advancing centrically) and the lesions of the spinal cord (progressing peripherally) have not yet been made out.

There is also evidence, both at the commencement and throughout the course of the disease, of localised congestions, expressed by rachalgia and spinal tenderness. The outset of the disease is insidious and slow. Pains, generally ascribed to rheumatism or neuralgia, first attract attention, particularly in damp weather. These pains may be fixed and aching, or darting, piercing, and transitory. Affections of the *second, third, fifth,* and *sixth* pairs of cranial nerves, sometimes with headache, giving rise to imperfect or double vision, strabismus, or contractions of the pupil, or dilatations, or deafness, are also insidious phenomena which may attract early notice. These several phenomena generally appear at different times and singly, although sometimes several together; and, after persisting for some time, may pass away. Weakness in some of the limbs may supervene, but no actual paralysis. Another distressing harbinger of the disease is incontinence of urine, associated with spermatorrhœa during the night, with a great proclivity to sexual congress, which is no mere impotent desire, but results in effective sexual intercourse. But after a period (of perhaps two years) the emissions on sexual intercourse become hasty, and a gradual loss of sexual desire and the power of erection supervenes. The bladder becomes irritable. Constipation is occasional when the pains are severe, and it always aggravates them. Transient tickling sensations prevail in different parts of the body, such as the lips, nose, cheeks, forehead, with occasional numbness of the feet and arms, and the peculiar feelings of so-called "pins and needles, as if they were asleep." After another long interval (say of two more years), undue fatigue after walking is experienced; the legs give way under the weight of the body, and there is a sensation as if the patient walked on a spring-board and could not keep his balance. These feelings may disappear and return; and eventually cutaneous hyperæsthesia or neuralgia of the skin (one side of the scrotum, testicle, buttock, or external part of thigh), always unilateral, supervenes. Paralysis takes no part in the phenomena; but rather disturbed co-ordination of muscular movements. Motorial inco-ordination, however, may not come on till after a period of several years (four or five) of suffering from such nervous symptoms. The pains then occur very irregularly, and last from a few hours to many days. At times they dart from limb to limb, or from one part of a limb to another; or, fixing on a small circumscribed spot, they give a boring, gnawing, or tearing sensation. The pains leave behind them a stiffness and soreness of the part. There may be atrophy of the optic disc, with contracted pupil; cutaneous anæsthesia of the soles of the feet, legs, forearms, and lips; and tactile sensibility seems slowly conducted to the sensory centre. There is decided diminution of cutaneous and muscular sensibility. "The floor is no longer distinctly felt by the feet; the foot seems to rest on wool, soft sand, or on a bladder filled with water. The rider no longer feels the resistance of the stirrup, and desires to shorten the stirrup leathers. If the patient also does not *see* his movements, the power of co-ordination will be still more uncertain; if, while erect, he closes his eyes, he immediately begins to sway about and totter. If he closes his eyes in the horizontal position, he cannot tell the location of his limbs—he cannot tell whether the right foot or leg is crossed over the left, or the reverse." Reflex movements are not excited by tickling the soles of the feet. A painful feeling of constriction, as if by a tight band, is sometimes experienced round the body; and the sensation of "bearing down," in the perineum and rectum, with constipation, prevails. The bladder imperfectly empties itself, and cannot retain the urine after experiencing the desire to void it. The desire to pass it is frequent and imperative, especially during the night. Some degree of paralysis of the bladder is indicated by diminished force in the strain of urine—the jet is not well arched, and drops dribble away after the act is believed to be over. The urine sometimes passes involuntarily. Sexual desire is eventually abolished. The gait is characteristic. The steps are quick, short, and jerking. The leg and foot are well lifted from the ground, but they are thrown spasmodically and forcibly forward, the whole limb being extended. In bringing the foot down, the heel strikes the ground first. As the disease progresses, the limbs are thrown involuntarily to the right or left without purpose, and without the power of restraining in any way their irregular movements. In walking, the eyes are kept fixed on the legs; and a stick is used, over the handle of which a handkerchief may be placed to increase the surface of contact required by the numbness of the hand. The muscular force remains good, so that efforts to bend or extend a limb against the will can be resisted with strength. Involuntary jerkings of the limbs in bed prevent sleep. It is especially at starting that the patient has the greatest difficulty in maintaining equilibrium.

When muscular inco-ordination of the upper extremities supervenes, the fingers become numb, and objects are handled with increasing clumsiness. The clothes cannot be buttoned, nor small things removed from the pockets by the fingers. If the patient is set on his legs with his eyes closed and his feet close together, although he has muscular power to stand yet he cannot preserve his body from falling, or guide himself in taking a few steps in the dark or with his eyes shut. He has no idea of the position of his lower extremities except from sight.

The duration of the disease ranges from a few months to thirty years, with a mean duration of *seven* years in 119 cases whose progress has been observed.

Treatment.—The intercurrent localised congestions in the region of the spinal cord point to topical blood-letting by cupping or leeches, cautiously employed, and perhaps frequently repeated; with persistent counter-irritation over the spine (by *blisters*, *moxæ*, *actual cautery*, or *ice*), particularly over those parts where there is tenderness or pain. *Phosphorus*, in the form of *phosphates of metals* and *salts*; of *diluted phosphoric* *acid*, as a drink in the daily allowance of water; or of *phosphate of soda* as an aperient, may be given with benefit. *Nitro-muriatic acid* as a tonic, and *cod-liver oil* as a dietetic agent, are also of use. Flannel should be worn next the skin, and chills from cold and damp carefully avoided by a chamois leather close-fitting jacket worn over the flannel, and reaching from the height of the clavicles as low as the folds of the *nates* behind. The diet ought to be of the most nutritious materials which the patient can digest.

Cannabis Indica, *belladonna*, and *codeia* give the greatest relief to the pains; *croton.chloral* is also indicated. *Nitrate of silver* is recommended in doses gradually increasing to half a grain daily.

So long as there is active local hyperæmia, the use of *electricity* is hurtful. *Faradisation* may be of use in restoring, to some extent, sensibility to the skin, where local cutaneous anæsthesia has prevailed, after which patients seem to walk better for a time; but when used at all, *electricity* ought only to be employed during the pauses in the course of the disease, and then with great caution, in the form of a constant current rather than the induced current, or *Faradisation.*

Phosphuret of iron and *ergot*, and *sulphur baths* are adjuvants, relieving pains and diminishing numbness.

PROGRESSIVE MUSCULAR ATROPHY.

Natural History.—A peculiar wasting of muscles, with atrophy of their contractile substance, and lesion in the anterior roots of the nerves of the spinal cord, with progressive paralysis.

It seems to be still an open question whether progressive muscular atrophy is really a substantive disease of the muscular texture, or dependent on a structural change in the spinal cord. The College of Physicians have numbered it and classed it among *diseases of the muscular system.* This is also the view adopted by Niemeyer, who believes that the long dispute as to the nature of this disease has been decided in favour of those who regard progressive muscular atrophy as a primary muscular affection; since almost all observers have agreed in regarding the continuance of excitability in the atrophied muscles, as long as they contain muscular elements, to be the pathognomonic sign of the disease. The nerves and muscles alike retain their excitability till the muscles perish. A similar paralysis co-exists with a great increase of bulk of the muscle-masses, but which is really an atrophy—the bulk being due to a growth of connective tissue and not muscle tissue, which latter wastes away probably by continuous absorption. (See cases described in

Lancet, May 8, 1869, by Dr. Balthazar Foster of Birmingham. I saw a similar case in the practice of Dr. Lake of Southampton, in 1873.)

The invasion of wasting palsy is usually slow and insidious. It creeps on unawares; and the victim of its attack only becomes cognisant of the disease when he notices some marked failure in certain muscular powers. The tailor notices that he cannot hold his needle; the shoemaker wonders that he cannot thrust his awl; the mason's hammer has grown too heavy for his strength; the gentleman feels an awkwardness in handling his pen, in pulling out his pocket-handkerchief, or in putting on his hat. On comparing the weakened member with its fellow, it is seen to be wasted, and the failure of power increases; the lifting power is reduced to nothing; the grasp is gone; and at last palsy becomes complete. In the majority of cases the disease commences in the upper extremities; and if it commences in the legs, it is probable that the atrophy will spread to the trunk. In more than *one-third* of the cases the hand was the member originally seized; and the exact spot nearly always the ball of the thumb, and the right hand more often than the left. Next to the hands, one or other shoulder is the favourite starting point. *Loss of power* is a chief phenomenon, and it corresponds to the grade of atrophy of the muscle; it is only in extreme cases that any part is reduced to absolute immobility. *Muscular vibrations*, consisting of little convulsive twitchings or quiverings of individual muscular bundles, are also early phenomena. They do not impart any movement to the entire muscle, but parts of the muscle seem to spring beneath the skin in quick momentary tremors, undulating over the surface of the muscle. Tactile sensation generally retains its delicacy in the skin over the affected muscles; but in some cases anæsthesia has been noticed, with exaggerated facility of reflex movement, chiefly in the muscles subject to the quiverings already described. Electric contractility exists, but is less in the affected muscles, and the amount of diminution is in direct proportion to the degree of their atrophy. Pain is by far the most common of the nervous symptoms; generally transient, and usually most marked at the commencement of the disease.

Unusual sensitiveness to low temperature is occasionally a prominent and very annoying symptom; the temperature of the affected parts is always lowered. As a rule, the general health does not seem impaired. Intelligence is clear, judgment firm, the emotions under control, and all the organic functions appear to be performed with regularity.

The treatment of *wasting palsy* ought to be strictly a restorative one. Preparations of *steel*, *wine*, and of *cod-liver oil*, with *localised Faradisa-*

tion, are the most likely agents to improve the condition of the body. Local means will aid the hygienic—namely, *methodical exercise* and *douche baths*, or *cold mineral baths;* so also *thermal* or *sulphur baths*, and *galvanism*. *Frictions*, with stimulating liniments (such as *camphor liniment*) are also favourably spoken of. *Faradisation* ought to be practised at least three times a week, *for from five to ten minutes each time*, and continued at least a month before it is given up, if negative results are only obtained. Every muscle ought to be Faradised in a special manner, according as it has suffered more or less in its electric contractility and nutrition. The power of the current ought never to be strong. When the sensibility of the muscle returns, the intensity of the current may be diminished. Its application should never be protracted beyond ten or fifteen minutes at the most, one minute, on an average, being allowed to each muscle, or distributed over several at a time.*

The application of the *constant* current of electricity—the *positive electrode* being placed in the region of the cervical sympathetic, and the *negative electrode* upon the cervical and upper dorsal regions of the spine, have been followed by long amelioration, if not by a positive cure.

INFANTILE PARALYSIS.

Natural History.—An essential palsy which is more or less permanent, and the result of an acute disease of the brain, spinal marrow, or peripheral nerves. The original lesion may have been an inflammation, or an effusion as the result of inflammation, which terminates in a local paralysis. It occurs almost exclusively among children during the period of dentition, especially during the eruption of the permanent teeth, especially of the molars, and for a short time afterwards—from the sixth month to the third year of life. It has also seemed to result as a sequence to various exanthemata and exposure to cold.

There may be signs of cerebral irritation, with more or less fever; but, as a rule, the paralysis comes on suddenly, or is noticed with surprise, having been preceded by no feature to attract notice. Sometimes also there may be convulsions; and when consciousness returns, a foot, a hand, a leg, or an arm, or the lower half of the body (paraplegia) is observed to be paralysed. Hemiplegia involving the extremities of both sides never occurs. Hence the disease seems to be independent of *cere-*

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* Volta-electric machines are made for medical purposes by Messrs. Stohrrer, of Dresden. Magneto-electric machines are to be got from most of our philosophical instrument makers. The apparatus for applying a continuous current, as modified by Dr. Althaus, is to be obtained of Messrs. Legendre & Morin, Paris, and Weiss of London.

bral apoplexy or *encephalitis.* The bladder and rectum also are never paralysed. There may be loss of power, but there is no diminution of sensibility at first, beyond slight numbness. The duration of the disease varies extremely; sometimes the paralysis will disappear in a day or two, and cure will be complete: but in most cases the paralysis is stationary and permanent. In the temporary form the contractility of the muscles remains; but in the permanent form a few only of the muscles of the paralysed limb retain electric contractility. In other muscles it is entirely gone.

After the disease has existed for some time, the limbs become soft, relaxed, and flexible, so that they may be placed in any position, and they eventually become atrophied or withered away; the skin becomes thin, fat is absorbed, the muscles waste away, and even the bones diminish. In the course of a year, at the growing age of childhood, the withered limb has lost in circumference and even in length compared with the sound one. Circulation, too, is diminished in its amount and activity; the skin of the limb assumes a livid hue, and hideous chilblains and ulcerations are easily formed. There is a marked depression of temperature in the paralysed limb, and nutritive changes are greatly impaired. Deformity, by shortening of the limb compared with the growing one, is soon apparent; and the limb may also become flexed.

The general health may remain unimpaired, and many sufferers in childhood attain even a great age; so that all that can be said in the way of prognosis is—"the disease does not endanger life;" but it leads to incurable deformity. No hope of cure can be reasonably held out. A paralytic and withered limb will remain for life.

Treatment.—The principles of treatment are restorative and not depressent. The general health must be improved. The systematic, active, and persistent application of the induced current of *electricity* is the best means of preserving the functions of the implicated muscles, and of arresting their atrophy and degeneration, provided all other hygienic arrangements are maintained which have already been insisted on as to food, clothing, and ventilation. *Mild purgation* may be required; alteratives, especially small doses of *mercury*, continued for a long time, have been of service; and so also have *quinine*, *iodide of potassium*, and *iodide of iron. Syrup of the phosphate of iron*, *quinine*, and *strychnia*, as well as all preparations mentioned under the subject of anæmia, are of use.

The muscles of the paralysed parts should be put into action as much as possible, either by passive movement or by the action of galvanic currents. Friction and shampooing ought also to be persevered in.

Three or four small circular wooden balls, about the size of a walnut, shut up in a box, with holes in its cover, so as to expose one-third part of the surface of the balls on a uniform level, make the best shampooing apparatus I have ever seen. The limb must be kept warm by proper coverings of flannel or chamois leather.

LOCAL PARALYSIS.

Natural History.—Paralysis limited to particular sets of muscles. Of this there are several varieties, three of which require special consideration—namely, (*a.*) *Facial paralysis;* (*b.*) *Scrivener's palsy;* (*c.*) *Glosso-laryngeal or pharyngeal paralysis.* The two former only are named by the College of Physicians. Of these in their order; and first, of—

FACIAL PARALYSIS.

Natural History.—Paralysis of the muscles of the face is usually confined to one side, but sometimes, though rarely, affecting both sides. It is apt to be followed by contracture or tonic spasm of the muscles previously paralysed ("Spasmodic Tic" of Marshall Hall).

Facial paralysis is due to one of two causes, namely—(1.) To a lesion of the trunk simply, or of branches of the *portio dura* nerve at some part of its course, generally through the petrous bone, and independent of cerebral disease. This form of facial paralysis is sometimes also known as *Bell's paralysis*, or *peripheral facial hemiplegia*, or *mimic facial palsy.* (2.) *Facial paralysis* may be due to a cerebral lesion—a cause which acts upon the nerve before it enters the internal *auditory meatus*—in which case it is usually accompanied by hemiplegia of the limbs on the same side. This form of facial paralysis is known as *cerebral* or *centric facial hemiplegia.* (3.) A third form of *facial paralysis* is ascribed to reflex paralysis of the *seventh pair*, consequent on paralysis or lesion of the *fifth pair* of nerves, generally an agency involving the peripheral ramifications over the face.

The phenomena of facial paralysis are confined to the "muscles of expression," including the *buccinator*, and do not involve the masticatory muscles (*masseter*, *temporal*, *pterygoid*) supplied by the fifth pair of nerves. A description of the phenomena of *facial paralysis* must therefore have due regard to the course and distribution of the *seventh nerve* (see Text-Books of Anatomy).

One very important point to remember is, that the *portio dura* of the seventh pair is the only motor nerve of the *buccinator muscle* for all its actions, whether of expression or of mastication; and that the fifth pair supplies it, not with motor, but with sensory fibres. The *buccinator muscle* is interrupted in all its functions, whether of expression or of mastication, whenever the *portio dura* is paralysed; it is unaffected, and all its actions are preserved, in motor paralysis of the *fifth pair.*

The threefold functions of the *portio dura* must also be recognised. Considered as a musculo-motor nerve, the *portio dura* contains within its common trunk the following sets of fibres serving different functions:—

(1.) *Voluntary motor fibres*, by which the voluntary movements of the features are performed, and by which especially labial and buccal speech and mastication are accomplished. (2.) *Emotional fibres*, by which the features express the passions more or less voluntarily. (3.) *Reflex motor fibres*, which are involuntary, for the act of winking and for the movements of the nostrils in the acts of respiration.

Looking, therefore, at the circuitous windings of the *portio dura*, its intricate distribution, and the various textures through which it passes, it can readily be understood how varied are its tendencies to be involved in disease, and even traumatic injury. Tumors, hæmorrhages, or other lesions, may involve the nerve within the cranium. While it traverses the circuitous windings of the *aqueduct of Fallopius*, it may be injured and pressed upon by the results of necrosis or caries of the bone, or of suppuration or lesions of the fibrous sheath or periosteum; while lesions or tumors, involving the parotid gland, may injure the nerve and paralyse the parts it supplies.

Three forms of paralysis of the facial nerves ought to be discriminated in considering the diagnosis of central facial hemiplegia, namely,—*Voluntary Motor Paralysis*, *Emotional Paralysis*, and *Reflex Paralysis.*

The accession of facial paralysis (when peripheral) is usually sudden, and is generally discovered by the patient when he begins to eat. He feels something peculiar in the act of chewing, and has some difficulty in mastication. When the food gets between the paralysed cheek and the teeth, the cheek is instinctively squeezed or pressed upon by the hand, in order to push the food between the teeth again. The difficulty of mastication only concerns the buccinator muscle, and not the other muscles of mastication. There is no pain. The patient is soon and often abruptly told, by the first kind friend who happens to meet him, that his mouth is awry, and that it becomes considerably more so when he laughs. He then naturally wishes to see all this for himself; and, on looking at his face in the looking-glass, he may verify the observation of his friend, and is then generally greatly frightened and alarmed by the discovery.

When the face remains at rest the paralysed side looks slightly flatter, and more flaccid and pendulous, than the sound side. The eye of the paralysed side is also more widely open than the eye on the sound side. When speaking, and still more when laughing is attempted, the angle of the mouth on the paralysed side remains perfectly motionless, but on the sound side it is immediately drawn upwards and outwards. The eyelids, the cheek, and half the lip of the paralysed side remaining thus motionless when efforts are made to contract the muscles, a singular and characteristic expression is given to the face. The eyelids remaining motionless on the paralysed side, the patient is unable to shut the eye, but the globe of the eye itself moves perfectly in any direction at will, which shews that the motor muscles of the eye are not affected, and that the paralysis affects exclusively the *orbicularis palpebrarum* muscle, and does not involve the *levator palpebræ superioris.* Sight is unimpaired. The tongue is protruded with ease and regularity; lingual articulation is sufficient; but articulation of certain words is difficult, on account of the paralysis of the cheek. Sometimes the arch formed by the pillars of the fauces is larger on the paralysed side than on the sound one, by the uvula inclining to the sound side. Cutaneous sensibility is unimpaired; and the patient may be in the best of health, the ailment being purely local—namely, paralysis of the facial muscles of expression on one side. There is an absence of all electric excitability of the paralysed muscles supplied by the seventh pair.

Treatment.—Paralysis due to lesions which are destructive of the nerve are beyond medical aid. In cases suitable for treatment the agents used with most benefit are *blood-letting* by *leeches* behind the ear of the affected side, or over the mastoid region. They ought to be applied repeatedly, especially if any pain exists on pressure in that region. *Blisters*, with dressings to keep them open, medicated by *veratria* or *strychnia* ($\frac{1}{25}$ to $\frac{1}{6}$ of a grain of *sulphate of strychnia* or of *veratria*), mixed with five or six times their weight of *pounded sugar. Electrisation* in the form of *Faradisation* by a Stöhrrer's two-celled volta-electric machine; or in the form of an *interrupted galvanic current*, from a *continuous current* battery (as from a Muirhead's battery of fifteen cells), the number of cells being very gradually increased.

In using Faradisation each facial muscle should be separately galvanised, instead of attempting to pass the current through the facial nerve. The muscles are thus more powerfully influenced, and they are more apt to regain *voluntary* contractility at different periods, some muscles before others. At first the apparatus should be one capable of producing currents with very rapid intermissions; but when any muscles begin to *contract*, the intermissions should be few, and the sittings at long intervals, otherwise contraction of the muscles is apt to increase and become incurable.

When contracture of muscles supervenes, they ought to be stretched or pulled out mechanically. To remedy contraction of the buccinator, a small billiard ball must be worn for a long time inside the cheek, to be replaced after a time by a larger one.

In cases where rheumatism or syphilis prevails, or periostitic affections, small doses of *iodide of potassium*, persevered in for a lengthened period, are of service, with the frequent use of *phosphate of soda* as a daily morning aperient. *Bichloride of mercury* (*corrosive sublimate*) in small doses, continued till the gums are slightly tender, is sometimes of service.

The daily action of the bowels ought to be carefully regulated, especially by such medicines as keep the colon in functional activity.

(*b.*) Scrivener's Palsy.

Natural History.—Morbid excitement of the motor fibres of the nerves of the muscles of the fingers and thumb holding the pen, resulting in cramps, so as completely to prevent writing. A want of co-ordination of the muscular movements engaged in writing—long-practised and very familiar movements—seems to be the first pathological element in the disease. In this respect the disease approaches locomotor ataxy, where there is partial loss of controlling power. Every attempt to write calls forth uncontrollable movements in the thumb, the index finger, and middle finger, so that the pen starts up and down on the paper. The handwriting ceases to be legible—a mere scrawl results, or grotesque interrupted scribbling. The more the patient persists in the attempt to write, the more does the difficulty of steadying the hand and using the pen increase. The visible and sensible contractions of the muscles of the thumb and fingers are soon followed by similar contractions of the forearms, even extending in some cases to the upper arm. Apprehensive attention to the subject and dread of the occurrence of spasm are generally sufficient to ensure a paroxysm after the disease is well established. The hand and arm seem capable of every other combined movement except that of writing; and when all attempts at writing cease, the spasms also subside and entirely disappear. On the other hand, the more the patient attempts to continue writing, so much the more violent does the spasm become. The disease is not entirely limited to the operation of writing. Shoemakers, milkmaids (or milkers of cows, goats, and ewes), nailsmiths, musicians, compositors, saddlers, sempstresses, and men who handle small hard articles with considerable muscular grasp, are subject to similar cramps. Hence the disease is known under a variety of names—as *cobbler's spasm*, *milker's spasm*, *nailer's spasm*, *writer's cramp.* One theory regarding the production of the cramps implies that they are reflex through the excitement of the *muscular nerves* or *muscular sense.* Hence, holding the hand even in the *attitude* of writing, although it does not grasp a pen nor touch the paper, will induce the spasms. On the other hand, it is believed that the irritation is similar to what takes place in the convulsive movements of chorea and stammering.

Treatment.—Tonic treatment, with rest from writing, has been attended with good results; also the galvanic current applied to the affected muscles. Complete rest from the usual mechanical use of the hand must be insisted on; also nourishing food, with a milk diet in abundance, or cod-liver oil. As to medicines, when the disease has not got beyond the sensation of heat and cramps in the ball of the thumb, I have seen good results from the *syrup of the phosphates of iron, quinine, and strychnia;* and generally those remedies noticed under the subject of anæmia may be prescribed. Mechanical appliances, such as contrivances which fill up, as by a ball, the palm of the hand on which the fingers rest in writing, have been of service; and there are also appliances by which writing may be accomplished without the aid of the fingers, and which therefore may be of service in securing rest to some extent, in cases where livelihood depends on writing.

(c.) Glosso-Laryngeal Paralysis—*Syn.*, Glosso-Pharyngeal Paralysis.

(Not recognised by the College of Physicians.)

Natural History.—Diminution and subsequent loss of the motor power of the tongue, soft palate, and lips, associated with structural changes in the roots of the motor nerves which supply the affected muscles. The disease progresses always rapidly to a fatal termination. Concurrent paralysis of the *lips*, *tongue*, *vellum*, *palate*, and *vocal cords*, together with the associated muscular movements of deglutition, have recently been recognised, and, which is more or less capable of explanation by the close anatomical connection between the muscles supplied by the *vagus*, the *spinal accessory*, and the *lingual* nerves. The *lower* rootlets of the spinal accessory nerve (forming the external branch) arise, in common with the anterior roots of the spinal nerves in the cervical and brachial region, from the anterior grey substance of the spinal cord; while the *upper* rootlets (forming the internal branch) have a totally different and a double origin—one from a special nucleus continuous with that of the pneumogastric behind the central canal, and the other from the proper nucleus of the hypoglossal in front of the canal. Some of the fibres of the hypoglossal seem to take their origin from the spinal accessory nucleus.

The constant anatomical lesion in this form of paralysis is atrophy of the motor roots of these nerves, sometimes extending to the anterior roots of several of the upper spinal nerves, attended with more or less paralysis of limbs and incipient muscular atrophy, tending to become general.

The disease is thus closely related to progressive muscular atrophy, with progressive palsy of cerebral nerves.

The earliest and most noticeable symptoms are those which are due to palsy of the muscles of the tongue, the soft palate, and the lips, those of the larynx and pharynx becoming implicated at a later period. The patient cannot blow, whistle, nor spit, nor pucker up his mouth, and saliva runs from the mouth involuntarily. The origin, progress, and termination of the disease are so characteristic that there is no other identical affection in the whole range of nosology. Embarrassment of speech first attracts attention. The tongue seems less supple, and the utterance becomes more and more thick. The food is apt to lodge between the teeth and the cheek, the cause of this being different from that which obtains in Bell's paralysis. In such facial paralysis it is due to paralysis of the buccinator muscle; here it is due to the circumstance that the tongue being more or less paralytic, awkward, and incapable at the tip, the patient is obliged to use his fingers to remove the food from between the teeth and the cheek, and so to replace it on the tongue. Pronunciation of certain words is made through the nose. The vowels *o* and *u* cannot be properly sounded, on account of the deficient contractility of the *orbicularis oris* muscle. Saliva is apt to dribble from the lips and corners of the mouth. The paralysis continuing to progress, the tongue at last lies motionless in the hollow of the mouth, behind the lower teeth. Its apex and base are equally motionless, and not a word can be articulated. The shape of the tongue is also altered. It has sunk down in the centre, presenting a hollow in the middle line, with its edges raised. The soft palate also droops, the tip of the uvula rests upon the tongue, and is generally callous or insensible to irritants. The first stage of deglutition thus becomes impossible. The morsels are swallowed by holding the head backwards, and facilitating their gliding down by fluids. Sometimes only a small quantity of the food gets into the œsophagus, the remainder being propelled upwards through the mouth and nostrils, and sometimes small portions of food will find their way into the larynx, causing great distress. The appetite remaining good, but swallowing being thus impossible, constant hunger aggravates the distress.

The expression of the countenance is blank and strange. Excessive weakness of the respiratory movements is soon superadded to these already serious symptoms. The walls of the chest and the diaphragm scarcely move. If the patient be asked to blow out a candle he cannot do it. The flame will be scarcely agitated by his utmost efforts to blow upon it. Coughing is equally inefficient; so that if catarrh should supervene, there is great difficulty in expelling the increased secretion of mucus. Asphyxia is thus apt to prove fatal. The heart's action becomes abnormally rapid, but fever does not exist. The body temperature tends to sink below the normal, and betokens, with the other phenomena, the imperfect oxygenation of the blood. General debility makes rapid progress, and the patient rather inclines to remain in bed, sitting up with his head supported on pillows, inclined to one side sufficiently to allow of the saliva flowing away which he is unable to swallow. Sleep is disturbed by paroxysms of suffocation, and death is apt to ensue suddenly by cessation of the heart's action, unaccompanied by pain or noise.

Treatment.—Faradisation is of doubtful efficacy at the commencement, but gives relief at the later periods, by temporarily restoring function to the affected muscles, to the lessening of the trouble of deglutition, and by exciting the respiratory acts.

SECTION VI.—FUNCTIONAL DISEASES OF THE NERVOUS SYSTEM.

TETANUS.

Natural History.—Involuntary, persistent, intense, and painful contractions, cramps, or spasms of more or less extensive groups of voluntary muscles; so that the whole of the body may seem to be affected, the spasms yielding and becoming intermittent in some groups of muscles, while at the same time persisting in others; or, the continuous tonic spasms are characterised by periods of paroxysmal aggravation of extreme intensity. This is one of the most formidable diseases of the nervous system. Sometimes idiopathic in its origin (but more often traumatic), it is classed as of functional origin; and its treatment is assigned to the physician or the surgeon according to the latent or apparent source of the disease; but such distinctions are purely conventional. Some antecedent disturbing cause exists, usually, if not invariably peripheral in its nature, and affecting some distant part of the nervous system, hence *idiopathic* is not to be understood as synonymous with "*causeless*" or "*spontaneous*." It merely means that the cause is unseen, or has not been identified or demonstrated, and is therefore probably unknown, or a matter of conjecture.

The morbid state of the spinal marrow, to which tetanus is due, is capable of being induced by a variety of agents; but it is most frequently met with in armies on active service, as the result of wounds, especially of lacerated, punctured, or gunshot wounds, or wounds made by large projectiles, as cannon balls, bombs; or it is the result of amputations rendered necessary by those wounds; or, from wounds in which foreign bodies remain lodged. Injuries of this kind are more dangerous upon extremities than upon other parts of the body. The conditions most favourable to the induction of tetanus are sudden changes of temperature, especially hot days followed by cold nights—so that the wounds are the predisposing, and exposure to cold, damp, and chill the exciting causes. When tetanus arises from the first of these causes, without any other being evident, the tetanus is said to be *traumatic;* when it arises from cold, damp, and chills without a wound, it is said to be *idiopathic.* The latter, however, is believed to be extremely rare in this country. The disease may follow any kind of injury, from the most trifling cut or scratch to a compound fracture or most severe operation. It follows also strains and contusions.

Besides wounds, strains, and contusions, some morbid poisons appear to produce this affection;—namely, *sulphuretted hydrogen*, *strychnia*, *brucia*, or their salts, or vegetable matter containing either or both those alkaloids —as *nux vomica*, *St. Ignatius's beans*, or the juice of the *upas tree.* These poisons, administered by the stomach or inoculated into the system, induce all the symptoms of intense tetanus, which has therefore been termed *artificial tetanus*, or *tetanus toxicus.* There is no test by which the *artificially* induced can be distinguished from the *real tetanus*—by which the results of poisoning and of disease can be distinguished, except that tetanus from disease or injury never proves so quickly fatal as the rapid cases of poisoning with *strychnia.*

The general premonitory symptoms may be so undefined as to appear unimportant, and so escape notice; but not so the uneasiness about the neck, the sense of contraction about the throat, and the stiffness of the jaws.

The interval between the reception of the injury and the first tetanic symptoms varies from the fourth to the fourteenth day, and rarely exceeds twenty-two days. Some time in the second week is the most common period. The more rapidly the disease comes on the more assuredly fatal will be the result.

The muscles of the neck, jaws, and throat are almost always the first to indicate the disease, as well as a peculiar expression of the face given by the contraction of the muscles about the eyebrows.

There are five varieties of tetanus—*trismus*, *tetanos*, *emprosthotonos*, *opisthotonos*, and *pleurosthotonos*.

Trismus is that state in which the disease is limited to the muscles of the lower jaw and throat. *Tetanos* is marked by the flexor and extensor muscles of the body generally being equally and strongly contracted, keeping the whole frame in such a state of tension that if you attempt to raise the leg, you raise the whole body, it being as inflexible as in death. *Emprosthotonos* is when the flexor muscles bend the body forwards. *Opisthotonos*, when they bend the body backwards. *Pleurosthotonos* is when they bend it laterally, or on one side only. *Trismus* is the most common: and though it may exist *per se*, it is generally the first and concomitant symptom of all the other forms. After *trismus*, *opisthotonos* is far the most common, both in this country and throughout Europe. The attack of either form of tetanus may be sudden; but more frequently it is preceded by an uneasy sensation and tension of the præcordia, followed by stiffness of the neck, shoulders, and lower jaw—a difficulty and uneasiness in bending or turning the head—a sensation like that commonly known as "*stiff neck*." The mouth opens with difficulty, and at last the jaws close completely, sometimes gradually, but always with great firmness—so that the disease has popularly got the name of "*lock-jaw*." At length the patient feels a sudden and painful traction of the ensiform cartilage; a pathognomonic sign of the disease. The muscles concerned in swallowing also become affected. This acute pain at the lower part of the sternum is one of the most distressing parts of the disease, piercing through to the back. It is believed to depend upon spasm of the diaphragm.

In *opisthotonos*, in addition to the *trismus*, the muscles of the face are generally spasmodically affected, the forehead is wrinkled, the brow is knit, the corners of the mouth are drawn, giving to the patient a most wretched grin—the *risus sardonicus*. The angles of the mouth are drawn outwards, and the lips are drawn apart, so as to expose the firmly clenched teeth. The eyes also are almost motionless and sunk in the socket; and, during the attack, the tongue is projected against the teeth, so, except for the trismus, it might be caught by a convulsive snapping of the jaws, and severely injured. The characteristic of *opisthotonos*, however, is, that the flexors of the back are thrown into such powerful action that the spine becomes arched, sometimes to such a degree that the body rests on the occiput and heels, as on the extreme points of the segment of a circle. The flexors of the back, however, are not the only muscles affected, for the shoulders are thrust forward by a strong action of the pectoral muscles, while the extremities are elongated and tightly braced by strong contractions both of their flexors and extensors. The whole of these different sets of muscles are thrown into action at the same moment, as if by the discharge of a powerful galvanic battery. The contracted muscles seem as hard as wood, and are the seat of such frightful pain as can be appreciated by any one who has suffered from severe cramp. The shock is transitory; and, having passed off, an interval succeeds which varies from a few minutes to half-an-hour, an hour, two hours, or longer, according to the severity of the disease. Exacerbations of the spasms commonly occur every ten or fifteen minutes, usually beginning by an increase of pain at the sternum, and lasting for two or three minutes. These paroxysms become more frequent — a shorter interval between — as the disease advances. But during this interval the patient lies, with his arms close to his sides, and his legs stretched out and touching each other, fearing lest the slightest motion should produce a recurrence of the attack. In mild cases the paroxysm returns only three or four times in the twenty-four hours; while in severe cases it returns not only every hour or every quarter of an hour, but every motion of the body or attempt to open the mouth is followed by an attack. His nights (or such few as he lives through) are sleepless, or only marked by a few minutes' broken slumber. The intellect is not involved. The other forms of the disease differ only by the different sets of muscles affected. The respiratory muscles are *specially* involved; and the *diaphragm* is affected in company with other muscles of inspiration and expiration.

The skin is, after a short time, covered with a profuse sweat, as during great exertion. The tongue is clean and moist; but the bowels are generally constipated, and the *sphincter ani* so contracted, that it is difficult to introduce a clyster-pipe. In cases in which tetanus supervenes on a suppurating wound, the sore generally dries up and is painful, while the muscles of the part are highly irritable.

In the last stage death usually results from a mixture of causes, but chiefly from *apnœa*, due to spasm of the larynx, or to the fixed condition of the respiratory muscles lasting longer than the necessities of respiration can withstand; associated with *asthenia* from flagging of the heart's action. "Unrelaxing cramp, exacerbations recurring with increasing frequency and violence—the broken rest, the imperfect nourishment of the frame — the exhausting effects on the nerve-centre, resulting from the continuous demands on it by the unremitting spasms,—all aid in bringing to a speedy close the acute form of the disease; and the unhappy victim sinks into a state of prostration, both physical and mental, which brings with it some relief to his sufferings before he dies." In some instances death occurs in twenty-four hours; more commonly on the second, third, and fourth day, and is seldom protracted beyond the eighth. Some few persons survive till the seventeenth or twentieth day; and in such cases the disease generally terminates in recovery.

Treatment.—Much good is gained by restoring the secretions to a healthy state; also by supporting the patient with fluid nourishment (to be given as enemata if they cannot be swallowed), and by endeavouring to tranquillise the high irritation under which he is labouring. The more or less obstinate constipation of the bowels which characterises this disease, and which is accompanied by a fœtid state of the dejections, ought to be overcome by (1.) *turpentine enemata*, and (2.) *calomel* and *jalap purgatives.*

If we can help our patient on one day after another, we gain much. Constant watching and constant attention are required by night as well as by day, and unflinching perseverance on the part of the sufferer to aid all efforts made in his behalf, besides the avoidance of all causes of excitement, and more especially cold air or winds, taking care to preserve a uniform temperature as much as possible. No hope of recovery may be indulged in unless the seizures continue to diminish in length and frequence, distinct relaxation of the contracted muscles occurring in those intervals; and unless the patient becomes able to take food, recovery in the fortunate cases takes place with extreme slowness. It is not till after the lapse of weeks that the muscles entirely lose their tension. Russian vapour baths are well spoken of; and also warm and hot air baths.

Too free use alike of *narcotics* and of *anæsthetics* must be guarded against. They are valuable aids in maintaining the existence of the patient from paroxysm to paroxysm, especially in the form of subcutaneous injections. The spasms during the paroxysm must also be relieved by *chloroform inhalation; croton chloral* is also indicated.

The hypodermic injection of a solution of *curare* deserves extensive trial, commencing with such small doses as $\frac{1}{8}$ to $\frac{1}{4}$ of a grain, gradually increasing from $\frac{1}{2}$ to $1\frac{1}{2}$ grains. A solution of *one* to *two* grains in 100 drops of water should be made fresh, and ten drops of this solution injected as a dose. The action lasts about four or five hours, and upon this fact its repetition must be regulated.

Aconite has been used in large and repeated doses. It also ought to be used hypodermically, and there appears to be a great tolerance of the remedy. The *extract* of *calabar bean* is also worthy of note—one grain by stomach, or one-third of a grain, mixed with x or xv minims of water, neutralised by *carbonate of soda*, is to be given by subcutaneous injection, repeated in two hours, and increasing the dose gradually.

Cannabis sativa or *Indian hemp* is a remedy of real value, if it can be got genuine and fresh. Three grains of the *extract*, or thirty drops of the *tincture*, may be given every half hour or hour till narcotism is attained. Cold should at the same time be applied to the spine.

HYDROPHOBIA.

Natural History.—A disease peculiar in the first instance to animals of the canine or feline race, the specific poison of which being implanted by them in man, or in other animals, produces in them a similar malady. The saliva or secretion issuing from the mouth of the diseased or rabid animal conveys the poison germs which inoculate the disease, either through a wound or through a thin epidermis without abrasion. The period of incubation of the poison after inoculation varies in man from four to sixteen weeks, or even longer, before the malady becomes developed. The earliest expression of the disease is characterised by severe constriction about the throat, spasmodic action of the diaphragm, and distress at the epigastrium: all of which are aggravated or brought about by attempts to take fluid, or by the least breath or current of air on the surface of the body, which produces an effect resembling that produced upon stepping into a cold bath. Tenacious and slimy saliva issues from the mouth. Paroxysms of phrensy, or of uncontrollable impulsive violence (rabidity), supervene. The duration of the disease varies from *three* to *six* or *seven* days, the greater number of cases terminating in death on the second and fourth days from the accession of symptoms. Death is generally sudden, and unexpected at the moment.

The disease is so named, not because there is any dread of water, but because in man the most prominent symptom is an inability to swallow, or to attempt to swallow, any fluid, on account of the extreme spasms which the attempt produces. Experiments have proved that the poison is of a definite character, that it may impregnate various substances, and that it retains its activity for a long period. Two points in the pathology of *rabies* are peculiar—namely, *first*, that a long period of latency may exist in the human subject; and, *second*, that inoculation is not always followed by the development of the specific disease. With regard to the first of these peculiarities, it is to be noticed that, although in some cases pain has been felt in the cicatrix a considerable time after the accident, and in a few a slight fever or a rapid pulse has been remarked to continue from the receipt of the injury to the outbreak of the malady, still the symptoms of the disease in man seldom shew themselves sooner than the *fortieth* day after inoculation, and rarely after two years. A matured zymosis seems essential to the production of the full influence of the poison; and it may be that a double zymosis takes place, first in the part and afterwards in the system, the result of which is either to multiply the poison or to increase its virulence. Undoubted instances, however, are on record in which the characteristic symptoms appeared as early as the *twelfth* day, and on the *eighth* day. It has been satisfactorily proved, on the other hand, that the period of incubation may extend over five and a half, six, or even nine months; and there is on record a large body of evidence in favour of the opinion that the incubation stage of hydrophobia may be prolonged not only over a series of months, but also over one year at least. An analysis of authentic observations has shewn that the shortest interval between the introduction of the poison and the appearance of the disease is fifteen days, the longest from seven to nine months, and that the average period is from four to seven weeks.

In all extremely long cases of incubation the question may be asked, whether the disease has been actually inoculated at a period so far back, or has there occurred a re-inoculation at some intervening period? It is known that the dog in the early stage of the disease has a disposition to lick the hands, face, or other exposed parts of persons, and especially of those with whom it is familiar; and there are cases on record where the disease has been implanted in this way.

Some observations, however, render it extremely probable that the period of incubation of the specific poison of hydrophobia is really indefinite; and the circumstances which, in man especially, seem to shorten the duration of this period, or prolong it, are quite unknown.

After the local incubation of the poison is complete, its specific action appears to be exercised upon the *medulla oblongata* and the *eighth pair of nerves*, and subsequently lesions of the structures supplied by the branches of the *eighth pair*. The action of the poison appears in the first instance to be made distinctly manifest by the œsophageal branch of the *eighth pair*, producing that derangement of function which gives rise to the characteristic symptom of the disease, or to the extreme difficulty of swallowing, especially of fluids; while the spasmodic catching of the breath, consequent even on touching the lips with any liquid, proves that the recurrent nerve is equally affected. Subsequently the eye and ear become distressed by every ray of light or impulse of sound, and the sense of touch is most painfully excited on the slightest breath of air passing over the surface of the body—all of which phenomena distinctly shew that the central and spinal nerves must be functionally affected.

The wound inflicted by the bite, whether neglected or dressed, generally heals up kindly, leaving a cicatrix, and for a time the patient usually suffers no other derangement of health than the depression of spirits which his apprehensions are calculated to excite. The first stage in the expression of the disease comprises the symptoms which precede the difficulty of swallowing; the second commences with the difficulty of swallowing, and terminates with the overthrow of the mind; the last stage embraces all the concluding phenomena.

The first stage commences in a few instances by the patient's attention being aroused by a numbness extending towards the sensorium from the injured part (which, if an extremity, may become tremulous); or pain is felt in the cicatrix, sometimes severe and sometimes trifling, which shoots up the bitten limb, following in general the course of the nerve towards the trunk. It shoots as if towards the heart, but there is no evidence of any lymphatic absorption. Pain, however, is by no means constant, and is for the most part absent. Chilliness may take the place of pain, with headache, or a slight attack of fever, and the patient is more excited or depressed than usual. These premonitory warnings last but a few hours, or at most a few days, when the fatal but characteristic symptom, "the difficulty and dread of swallowing" —a symptom which distinguishes this malady from all others—appears, and the hydrophobic stage generally comes on suddenly; and such horrible sensations accompany the effort, that whatever afterwards even recalls the idea of a fluid excites violent agitation and aversion. "The distressing thirst, accompanied by the dread of making the effort to satisfy it; the wild and wandering expression of the countenance; the suffused eye; and, beyond all, the helpless, purposeless, unremitting restlessness of this disease, suggestive of the undefined apprehension of something more terrible than death itself, under which the senses reel and the intellect staggers, distinguish *rabies* from *tetanus* and all other convulsive affections, and mark it as the most dreadful of diseases to suffer or to witness." The hydrophobia, or inability to swallow fluids, is shortly accompanied by an increased flow of saliva, copious and viscid, so that it adheres to the throat, and causes incessant spitting. The quantity expectorated may be taken as a measure of the violence of the disease. The ejection of the saliva from the mouth as it forms, is mainly owing to the dread of attempting to swallow it, causing the spasmodic paroxysms of suffocation. Another series of symptoms of dreadful severity now come on—namely, a highly exalted state of every corporeal sense. The patient shrinks at the slightest breath that blows over him; the passage of a fly, the motion of the bed-curtain, or any attempt to touch him, produces indescribable agony, almost amounting to convulsions. The effect produced by these causes very much resembles that produced upon stepping into a cold bath. The sense of sight is no less a source of terror than that of touch; the approach of a candle, the reflection from a mirror or other polished surface, occasions the same distressing effect. The hearing is as strongly affected as the other senses, so that the least noise, and especially that of pouring out fluids, throws him into a fearful paroxysm.

At last the cerebral functions become disturbed, the mind being either filled with dreadful apprehensions, or so completely overthrown that paroxysms of uncontrollable impulsive violence follow. A rabid desire occurs to tear in pieces who and whatever opposes him, often strongest against those to whom he is most attached, although he may struggle to suppress it. Horror, anxiety, terror, and depression are strongly depicted on the countenance; every symptom is aggravated, the saliva grows thick and ropy, while the sufferer, not daring to make the slightest attempt to swallow, spits it out incessantly, oftentimes with frequent retchings and vomiting. Intense restlessness prevails. In this state, falling into convulsions, the patient expires as by asphyxia; or, exhausted by his great efforts, a sudden calm ensues, and he dies by failure of the action of the heart.

Treatment.—As there are but very few authenticated cases of recovery from hydrophobia, so there are few instances of any mitigation of the symptoms by the use of medicine. The following draught has been found rather to promote euthanasia than to hold out any prospect of cure:—

℞. *Spirit. Æther. Sulph.*, *Tinct. Opii*, ā ā ♏xx.; *Spirit. Ammon. Aromat.*, ʒss.; *Chloroform*, ♏xx.; *Mist. Camph.* ℥iss.; *misce.* To be given as often as may be *considered safe.* On the same principle, *chlorodyne* or *chloral hydrate* ought to be given; and the *vapour bath* is sometimes useful in moderating spasm; with subcutaneous injections, as stated under tetanus.

The probabilities are, that unless the operation of excision, or cauterisation, be performed within a few minutes after the bite of the rabid animal, it is impossible to save the patient from the fatal disease, which may threaten him at any moment. The theory which maintains that incubation first takes place in the wound by which the poison is originally implanted, suggests the most rational prophylactic—namely, to destroy entirely by *potassa fusa* the whole cicatrix, where practicable, or by some other surgical means entirely to remove it, *at as early a period as possible*, and *previous to the occurrence of symptoms.* When premonitory symptoms are first observed, the following measures ought to be adopted:—(1.) The original cicatrix should be freely laid open, and suppuration from it as speedily and freely produced and maintained as possible. (2.) The nerves, or nerve, leading to the part are to be divided without delay, the more remote from the wound the better. (3.) Free perspiration should be promoted by the hot air bath. (4.) Bleeding from the arm to syncope in robust persons with sthenic symptoms, or cuppings on the nape of the neck, are modes of practice indicated by the lesions found after death.

INFANTILE CONVULSIONS.

Natural History—Convulsive seizures, consisting of contraction of muscles by gradual but rapid shortening of the muscular fibres, causing such hardness and stiffness that the joints cannot be flexed. This period of tonic contraction is followed by clonic spasmodic phenomena, characterised by the occurrence of alternating movements of contraction and relaxation, independent of the will, which is as powerless to suspend or moderate them as to excite them. Such convulsions may occur from the time of birth until the end of the seventh or eighth year, and arise from the following causes:—

(1.) Manifest anatomical *central* lesions of the nervous system, especially during the progress of acute diseases of the brain or spinal marrow, which are analogous to forms of epilepsy arising from cerebral tumors and other chronic disorders of the brain.

(2.) The premonitory beginnings of different diseases, and peripheral irritations—for example, (*a.*) *Epilepsy;* (*b.*) *Hysteria;* (*c.*) *Chorea;* (*d.*) *Tetanus;* (*e.*) Blood poisoning, as of uræmia and of narcotic poisons; (*f.*) Material of contagious diseases, which by convulsions usher in the attack of *scarlet fever*, *measles*, or *small pox;* (*g.*) The high fever-heat of such diseases as pneumonia and other inflammatory diseases of childhood; (*h.*) The result of terror and other mental emotions, causing excitement of the cerebral ganglia, transmitted thence to the medulla oblongata; (*i.*) Irritation of peripheral nerves from teething, intestinal worms, indigestion, or painful injuries of the skin like burns, or of a pin or needle passing from the dress into the skin, or from application of blisters, or sinapisms, or painful eruptions, which, being transmitted to the medulla oblongata, induce that morbidly irritable state which is expressed by "reflex convulsions."

(3.) Infantile convulsions occur as the expression of a *hereditary predisposition.* This nervous susceptibility manifests itself in different generations, in the same or in different ways. It commonly happens that parents —mothers especially—who in their infancy were subject to fits, give birth to individuals who, in their turn, are affected in the same way. Infantile convulsions are thus often congenital, all the children of a family being sometimes affected in the same way.

(4.) Infantile convulsions also occur as the result of *insufficient feeding*, or of bad food; or in children who have lost large quantities of blood from *spontaneous hæmorrhage*, *venesection*, or *leeches*, or who have had profuse *diarrhœa* persisting for a long time. In proportion as the nutritive and vegetative functions are feeble and languishing, so will nervous phenomena be mobile, exalted, and irregular.

(5.) As a consequence of albuminuria—as an acute affection—a result of scarlet fever, or of Bright's disease.

(6.) Traumatic injury—such as penetration of the brain by fine needles.

In the *acute exanthemata* and in *pneumonia*, convulsions in children often seem to take the place of the precursory chill or rigor of the commencement of such acute diseases in older people; and which in reality is a convulsion of a small degree due to alternate contraction and relaxation of muscles.

Infantile convulsions may come on like an epileptic fit in the adult, with no premonitory warning to indicate the invasion of the disease. The child may utter a cry, lose consciousness, become rigid as a deal board, and ultimately commence to struggle with a fixed chest and suspended respiration. The face, pale at first, becomes red and livid, and the eyes fill with tears, which run over the cheeks, and the veins of the neck are turgid, and project like knotted cords. Disorderly and involuntary contractions of many muscles then commence,— the limbs are alternately flexed and extended; the fingers and toes successively bent and stretched out, separated from or approximated to one another, but most frequently in a state of forcible flexion; the thumb is adducted and hidden by the fingers. The head is drawn backwards or is bent forwards; and sometimes it is pulled laterally by irregular and jerking rotatory movements. The muscles of the face share in the *general convulsions;* the eyes are the seat of jerking movements, and roll in their sockets; they are generally drawn up under the upper eyelid; more rarely they are drawn downwards, and there is *strabismus convergens.* The labial commissures are dragged upwards and outwards,—hence the distorted face may be frightful to beholders; and then, on each convulsive shock, the air passes through the kind of funnel formed by the corners of the half-opened buccal orifice, making a suction noise, accompanied by a flow of frothy, and sometimes of bloody saliva, for the tongue is apt to be protruded, and may be lacerated by the teeth. As the muscles of the trunk are affected during the tonic stage, the inspiratory muscles are fixed, and the larynx, spasmodically contracted, no longer permits the free passage of air. Contraction and convulsion of the abdominal muscles cause expulsion of urine and of fæces. The *clonic spasms* are at first rapid and limited, but become slower and more extensive, till at last a deep inspiration, followed by complete relaxation, announces the end of the fit. The child is then apt to fall into a state of somnolency and stupor. Such a fit may last one or two minutes, and may be repeated over and over again during half a day, a whole day, or many more days, as during hooping-cough. A repetition of fits may be anticipated, when the sleep is not sound after the first fit has subsided, when the child throws itself about, gnashes and grinds its teeth, and twitches its limbs from time to time. There are also localised convulsions to be recognised, such as *partial convulsions* of one-half of the body, of the trunk of the body, of the muscles of the face, and of the muscles of the eye. Another form of partial convulsion consists of spasms of the pharynx, larynx, and muscles of respiration, especially accompanied by movements of the globes of the eyes, to which the vague names of "*inward fits*," "*inward convulsions*," or "*inward spasms*," have been given. Children a few days after birth are apt to suffer from slight convulsions of this kind, expressed by the rolling about of the eyes during sleep—the eyeballs turned upwards with the corneæ under the upper lids, gentle moaning, difficult breathing, twitches of the muscles of the face, flushing, or lividity of the face. Of all the causes mentioned in connection with convulsions, none are so common or universal as *indigestion.* Hence the quantity and quality of the food and condition of the evacuations ought to be inquired into at the first, also as to progress of dentition, and the occurrence of intestinal worms.

Treatment.—In most cases it ought to be expectant to this extent, that the clothing must be loosened completely, so as to admit air freely. *Anti-spasmodics*, such as *ether* alone, or combined with *musk* or *belladonna* may be given, till the progress, duration, seat, or probable cause of the convulsions may be ascertained. An *emetic*, a *purgative enema*, a *searching purgative*, such as *calomel*, combined with *jalap* or *rhubarb*, may be indicated; or the removal of a pin in the dress, which had been long and continuously pricking the skin, or too tight a dress, may, on removal or rectification, cause the convulsion to cease. A clyster of one part vinegar and three parts water, the application of cold compresses to the head, or of leeches behind the ear of plethoric children, if the convulsions do not subside, are remedies which may be used at once.

If symptoms denote stupor, cold effusions should be prescribed; if, on the other hand, they denote collapse, *alcohol*, *camphor*, *musk*, and other *stimulants* must be used, with food.

If indigestion is traced as the source of the fits in an infant or young child, a few drops of *aromatic spirit of ammonia*, or the same quantity of *ether*, may be given in a teaspoonful of water, or a drop of *anise oil*, rubbed up with sugar, may be given from time to time, by laying the powdered sugar so saturated on the tongue of the child.

If dentition is causing the convulsions, the dense tissue of the gums over the tooth ought to be relieved by lancing it, or cutting it across over the corner of the tooth.

Bromide of potassium is a medicine from which more may be hoped for than from any other. If there be inability to swallow, it ought to be given in *enemata* of *beef-tea*. Where great restlessness prevails, *hydrocyanic acid*, with *tincture of hyoscyamus*, may be given. *Compression of the carotid arteries and chloroform inhalation, or a mixture of ether and chloroform*, are only to be had recourse to in cases of prolonged duration, depending on such irritation as that of dentition. Anæsthesia thus induced is of great value.

EPILEPSY.

Natural History.—A complex condition, in which, as a rule, a sudden and complete loss of consciousness prevails, associated with convulsions, tonic at first, but which subsequently become clonic, and ultimately impede the respiratory process. The attack, lasting from two to twenty minutes, is followed by some exhaustion and sleep. The expression of the epileptic state varies from the most severe paroxysm to simple vertigo, a momentary suspension of consciousness, a fixity of gaze, a totter of step, and a confusion which appears and disappears almost instantaneously, and which only the patient can recognise. Unlike chorea and tetanus, there is an interruption alike in consciousness and insensibility, which is as essential an element in the epileptic fit as the convulsions.

The attack occurs in 95 cases out of 100 without any warning. These warnings are known by the term "*aura*." They comprise all the premonitory symptoms which may prognosticate the approach of a fit. Many patients on the approach of the fit, have vertigo or headache; some swelling of the veins, or throbbing of the arteries of the head; while others again have ocular spectra, or affections of the other senses. Two forms of epileptic seizures are to be recognised, namely—

(1.) Lapses of consciousness only. (2.) Lapses of consciousness, with the accompaniment of slight convulsive movement. In the former—the genuine "*petit mal*"—the patient has simply become giddy (*epileptic vertigo*), often amid business or conversation. He must then either seat himself, or he staggers, or sinks slowly to the ground without any outcry. His face is pale, his eyes are fixed. A few convulsive twitches play over his face and the extremities, especially the upper ones. He recovers in a few minutes, looks wildly around him, and after the lapse of a few minutes appears to be himself again, and able to resume his usual avocation. A still more mild and rudimentary form of epilepsy is where consciousness alone is clouded for a few seconds, the countenance pale, and the eyes fixed; but the patient does not fall; although he may lose hold of anything he has in his hand at the time.

Regarding the frequency of the occurrence of individual symptoms, headache has been noticed in a ratio of 53·8 per cent.; and the pathological import of the symptom varies much according to the period at which it is met with. It may be connected with the fit etiologically; or it may be a consequence of the attack; or it may be a casual coincidence.

The relative frequency of the different classes of premonitory symptoms are as follows:—*Sensational symptoms*, *mental and emotional; motorial phenomena*, *vascular* and *secretory disturbance*.

In the *adult*, whether the warning symptoms be or be not present, the attack usually commences by the patient uttering a cry, losing on the instant all consciousness, and falling down in convulsions, his mouth covered with foam. The more immediate or directly precursory symptom of this event is a momentary and death-like paleness of the face at the time of the fall, which is immediately followed by the flushed face. The convulsions vary from the most trifling and transitory movement to the most frightful, terrific, and long-continued struggles. In mild cases only one limb is convulsed; in others only the face, the lip, or the eye. In severe forms the convulsions are more formidable; the hair stands on end, the forehead is wrinkled, and the brow is knit. If the eyelid be opened, the eye is seen to be injected, sometimes convulsively agitated, at other times in a state of strabismus, and sometimes fixed, more commonly the eyelid is quivering, and half open, so as to shew the white of the lower portion of the conjunctivæ. The face is red, or livid and swollen, the teeth generally clenched, and the lips covered with foam; sometimes, however, the mouth is open and the tongue thrust forward; and should the masseter muscles now act spasmodically, it may be bitten through, or otherwise much injured, and the foam consequently be mixed with blood. The force with which the jaw closes is so great that teeth have been known to be broken and the jaw luxated. The limbs, also, are violently convulsed, thrown about in every direction, and with such power that it often requires three or four persons to prevent the patient seriously hurting himself. In these convulsions, also, the hands are strongly clenched, and the body is often arched backwards (*opisthotonos*), when, on the muscles relaxing, the patient may fall to the ground with great force. While the limbs and trunk are thus powerfully agitated, the muscles of the chest are often spasmodically fixed, so as hardly to permit the acts of respiration.

The functions of organic life are also implicated. The pulse is generally frequent, sometimes hard and intermittent, and at other times scarcely perceptible, although the heart's beats are strong and tumultuous. The respiration is stertorous, the stomach and bowels troubled with borborygmi, the skin bathed in sweat, while the urine, semen, or fæces are occasionally emitted. Blood sometimes flows from the eyes, ears, or nose—frightfully expressive of the violence of the attack. When the paroxysm has reached its crisis the muscles relax, the convulsions subside, the respiration becomes more free, the pulse more regular, and the countenance more natural; and at length the patient falls into a heavy sleep, from which he awakes sometimes in good health, but more often shaken, exhausted, and suffering from severe headache, which lasts some hours or even days. In neither case, however, has he the slightest consciousness or remembrance of what has passed. In other instances the termination of one paroxysm is but the beginning of another, and the succession is occasionally so continued that the attack, with short intermissions, may last twenty-four or forty-eight hours, or even longer.

When *children*, from teething or other causes, are seized with epilepsy, the attack is often preceded by a spasmodic affection of the larynx, causing the whooping or crowing sound so well known and characteristic; but it may, and often does, take place without any warning. In the former case the child perhaps is in his best health, but on awakening is seized with the characteristic whoop, often accompanied by a spasmodic flexion of the thumb against the palm; or the fingers are clenched, or the toes bent. These symptoms may recur a varied number of times, till at length, with or without this warning, the eye is seen staring, fixed, or convulsed; the face and extemities pale or livid; the hand clenched, the body rigid, and the head and trunk curved backwards. The epileptic fit is then formed; and the *fontanelle* is seen distended and pulsating. These symptoms generally last only a few minutes, when a strong expiration takes place: a fit of crying succeeds, and the child, much exhausted, recovers its consciousness, and after a short interval generally falls asleep. These convulsions seldom occur during the early periods of lactation, nor until the commencement of the period of dentition, and rarely after three years of age.

The duration of the paroxysm in children seldom lasts more than a few minutes. In the adult it often does not exceed that period; but in many cases it lasts half an hour to two hours; while in others the greater part of the day passes before the paroxysm terminates.

It seldom happens that the paroxysm occurs but once. In the mildest case in the child it is commonly repeated three or four times in the course of the first three or four years of childhood, while in other cases it will occur three or four times in the day; and in severe cases the child is hardly out of one fit before it falls into another, till at length they gradually subside. In the adult the frequency of the fit varies extremely in different patients. In some instances there is an interval of several years; at others it returns annually, or every six months, or mensually, weekly, or even daily; while others will have twenty or thirty fits in the course of the same day. The period of the day at which the attack takes place is also very varied, for it may occur during the day, at night when asleep, or in the morning when just awakening.

Many cases of epilepsy are developed between ten and twenty years of age; and most cases begin about the period of puberty. In cases of hereditary transmission, the disease appears at an early period as infantile convulsions of an epileptic character. The influences of *intemperance*, of *syphilis*, and of *mental disturbance* in parents, and especially on the part of the mother, are now fully recognised as predisposing causes of this disease, as well as all morbid states of the blood connected with gout, rheumatism, and acute specific diseases. Reflex irritation furnishes other causes of epilepsy, especially such as arise from certain states of other viscera, as in uterine and ovarium disturbance from pregnancy or menstruation, the influence of dentition in children, and of intestinal worms.

Injuries to the head, such as by blows, or the effects of disease, such as sunstroke, are also recognised causes; while the influence of mental emotions, or of mental over-work, are not less important sources of the disease.

Treatment.—The treatment divides itself into what is to be done during a paroxysm, and subsequently during the intervals.

When adults are labouring under "*a fit of epilepsy*," little, in general, can or ought to be done except bringing the patient into fresh air, taking off what may be around the neck, and baring the chest, together with the more imperative duty of preventing the patient doing himself any injury, as by a gag to prevent laceration of the tongue or cheeks. Bleeding, so often had recourse to, is rarely found beneficial, except as regards females suffering from suppressed menstruation. If, however, the paroxysm be greatly prolonged, the application of cold to the head and chest, and opening the temporal artery, where symptoms of excessive cerebral congestion are obvious, may be of some service in cases recognised as plethoric, and where danger is from *asphyxia*. It is of great importance to shorten the paroxysm as much as possible. The galvanic current may be used during the fit. The conductors should be moistened sponges, so as to insure the passage of the current to the deeper-seated tissues. *Turpentine enemata* may also be required.

The paroxysm over, the probable exciting cause of the paroxysm should be investigated, and, if possible, removed; the state of the bowels and stomach should be particularly inquired into and regulated, and leeches should be applied to the temples if headache be severe. In women, also, the morbid state of the catamenia, if defective or excessive, should be remedied. These few simple rules are of the first importance, not only as removing the immediate inconveniences incident to the attack, but also as a means of prolonging the interval, and perhaps preventing its future occurrence. We must take into account, and search out for all causes which may have contributed to the malady. In assuming the charge of an epileptic, it is necessary to commence by regulating the external relations of the patient, his habits and his bodily health, so that every suspicious condition of his life to which the origin of the disease can in any way be ascribed may be corrected. In a few instances the patient is cured by such measures, and the prevailing principles of treatment in epilepsy mainly consist in local derivation, or counter-irritation directed to subdue cerebral disturbance, and in the use of such tonic remedies as may be indicated by a careful inquiry into the condition of the individual organs, and how their several functions are performed. The intensity of the headache suggests more or less active counter-irritation by *blisters*, *dry or wet cupping*, *ointment of tartrate of antimony*, *setons*, or even *the actual cautery applied under chloroform.*

The medicinal remedies that have been employed are *valerian*, *iron*, *zinc*, *quinine*, *musk*, *opium*, *asafœtida*, *the iodide and bromide of potassium*, *camphor*, *ether*, *and the preparations of turpentine*. *Bromide of potassium*, in five to thirty grain doses, still maintains the best curative reputation in the severe cases, and when the fits occur during the day. When the intervals between the fits are of short duration, the dose ought to be increased gradually. The *nitrate of silver*, once esteemed a specific in this complaint, has not only failed, but, by occasionally staining the *rete mucosum* of a dingy blue, has often permanently disfigured the patient. Of the long catalogue of drugs which has been mentioned, each medicine is perhaps useful for a few weeks; but after that period its good effects are, for the most part, lost.

The employment of purgatives is indicated for the removal of waste matter, to act as a derivative from the head, and expel foreign matters or worms from the intestines, and generally to regulate the bowels. The laxatives most suited to epileptics are—*rhubarb*, *compound colocynth pill*, *aloes*, *castor oil*, *taraxicum*, *sulphur in combination with magnesia or rhubarb*, or *guaiacum;* and the Pullna bitter water imported from Bohemia, containing, as it does, *sulphates of soda*, *of lime*, *of potash*, *and of magnesia*, *carbonates of lime and of magnesia*, *chloride of magnesium*, *and phosphates of lime* with *free carbonic acid*—about 200 grains of saline matter in a pint, so that half a tumblerful taken in the morning generally produces a full pultaceous evacuation.

Independently of its anthelmintic properties, the use of *turpentine* is of advantage. It may be given in half drachm doses every six hours.

If a scar, foreign body, tumor, or *neuroma*, be found pressing on a peripheral nerve, its removal by operation may cure the epilepsy.

The preparations of iron and zinc are the most useful tonics; and for the general principles on which iron may be administered, the reader is referred to the pages on *anæmia*. *Belladonna*, in the hands of Trousseau, obtained alleviation and improvement in many cases, and is best combined with *sulphate of zinc*.

SPASM OF MUSCLE.

Natural History.—Idiopathic spasms, commonly called "*cramps*," are tonic or clonic contractions of muscles, not attributable to disease of the brain or spinal marrow. Some regard them as a kind of rheumatic affection, and attributable to hyperæmia, with œdema of the neurilemma, or other transient local condition.

Muscular spasms are apt to occur during the course of, or succeeding convalescence from acute or chronic disorders, such as *typhus*, *enteric fever*, *malarious fevers*, *Bright's disease*, and *epidemic diphtheritis.*

Spasms, cramps, or *hypercenisis* occur in various situations, more or less limited to certain muscles or groups of muscles.

(*a.*) *Spasm of facial muscles*, sometimes called *mimic spasm of the face*, or *convulsive tic*, is generally due to some noxious influence acting on the surface of the face itself, such as *cold* or *contusions.* Sometimes the spasms are believed to be thus far reflex that they seem to arise from the irritation of such remote organs as the rectum or intestines from parasites, or the uterus in *hysteria* or diseases of that organ.

Sometimes the spasm is confined to the eyelids, or to the muscles of the ear, or to the lips, a lip, or portion of a lip. When fully expressed, "grimaces occur, either intermittent or constant, involving one side of the face, and more rarely both sides. In the former case they consist chiefly of elevation or depression of the occipito-frontal muscle. Corrugation of the eyebrows, blinking and closure of the eyelids, twitching and sniffling of the *alæ nasi*, and drawing up and down of the corners of the mouth. These attacks set in suddenly, and as suddenly subside, to recur with equal suddenness at short intervals. In permanent tonic contraction of the facial muscles, the furrows and hollows in the affected side of the face are deeper, the tip of the nose, the commissure of the lips and the chin are drawn to the convulsed side. The muscles are hard and tense, and impede motion so much that one eye cannot be so completely closed as the other."

(*b.*) *Spasms in the region of the spinal accessory muscle* are sometimes assigned to twists of the neck, cold, or disease of the vertebræ, and are expressed in the muscles supplied by the nerve—*i. e.*, the *trapezius* and *sterno cleidomastoideus*—and according as one or other muscle is more affected, so are the movements of the head in one direction or another. The paroxysms generally cease during sleep; and clonic spasms develop in a slow and gradual manner. When the muscles on both sides are similarly affected, the movement is that of incessant nodding (salaam convulsions).

(*c.*) *Idiopathic cramp of muscles of the limbs* is not uncommon as a form of rheumatism, and is sometimes the result of cold or of reflex intestinal irritation. The calves of the legs are the most frequent seat of cramps, which often awake the patient suddenly by their pain, and the desire to grasp the limb or press the foot against a firm resistance.

(*d.*) *Scrivener's palsy* or *spasm* ought rather to be considered here as a local spasm or cramp, for such is the cause of the paralysis.

(*e.*) *Spasms of the muscles of the bladder* frequently arise from the irritation of foreign bodies in that cavity, such as *calculi;* and the combined conditions lead to some organic lesion. The causes of spasm of the bladder have been arranged into *cerebral*, *spinal*, and *reflex.* Mental emotion, such as will induce the "goose skin," through the sympathetic, will, under like circumstances, also induce violent contraction of the bladder-muscles, with intense inclination to pass water, even to the extent of passing it; so that individuals have been known to micturate from terror or sudden fright. *Vesical spasm* is generally, however, of reflex origin, induced by such conditions as irritation of the urethra (*catheterism*), of the *rectum* (*anal fissure*, or *hæmorrhoids*), or of the womb (*uterine tumors*, *pregnancy*).

Treatment in all these cases must be directed towards the removal of the probable cause, and improvement of the general health.

Laryngismus Stridulus—*Syn.*, Spasm of the Glottis; Spasmodic Croup; Child Crowing.

Natural History.—A paroxysmal spasmodic disease, in which the muscles of the glottis are contracted, the vocal cords tightly stretched, and the glottis temporarily, partially, or completely closed. The affection depends upon some morbid excitement of the *par vagum*, direct or reflex. It is only seen in infants, especially during the period of first dentition; in children before the completion of the second year; and, in the great majority of cases, between the fourth and tenth month. During such partial or complete closure of the glottis, the entrance of air into the lungs is impeded or arrested, so that breathing becomes suddenly difficult; inspiration is effected by rapid spasmodic efforts, accompanied with laborious motions of the larynx, during which the child crows like a cock. Congenital predisposition exists, as in many families almost all the children in succession are affected. There are neither symptoms of fever nor of inflammation, but suddenly, and without premonitory warning, except occasional but slight breathlessness or wheezing, the breathing is performed by violent and noisy inspirations, with each of which the peculiar squeaking or crowing sound is heard. The eyes become fixed and glaring, and the face is expressive of great distress. The head is thrown backwards, and the spine is bent as in oposthotonos. If the paroxysms persist and recur for any length of time, the face and extremities become bluish or purple. At length the paroxysm terminates by a forcible expiration, generally followed by a fit of crying, when the child, completely exhausted, falls asleep. It is the sudden, violent interruption of respiration by spasm which is pathognomonic of the seizure. There is no cough, and no hoarseness—the *par vagum* alone is affected, so that *croup*, or *laryngeal catarrh*, may not be confounded with *laryngismus stridulus*, which is therefore also known as "*spurious croup*." The spasmodic nervous nature of the affection is still more obvious from the fact that in some cases there are also at the same time spasmodic contractions of the fingers and toes, or of the hands and feet; and occasionally general convulsions may occur, and endanger life. In many cases also the thumbs and fingers are forcibly and involuntarily inflected into the palms of the hands, and one or two toes, generally the large one and that next it, are, in like manner, forcibly inflected towards the soles of the feet. These motions are attended with feelings of pain, and any attempt to extend either the fingers or toes always causes pain and suffering. Sometimes the affection commences by these spasms of the fingers and toes preceding the crowing inspiration. There is evidence to shew that *cerebro-spinal* irritation is the more immediate cause of the disorder. The irritation which establishes the reflex excitement consists mainly of three kinds:—(*a.*) The irritation of teething through the *trifacial nerve;* (*b.*) the irritation of the gastric intestinal tract by overfeeding or improper food, through the *pneumogastric nerve;* (*c.*) the irritation of constipation, diarrhœa, or intestinal obstruction, acting through the *spinal nerves.* These act through the medium of the *spinal marrow*, and influence—(1.) *The constrictor of the larynx*, through the *inferior or recurrent laryngeal nerve;* and, (2.) the *motions of respiration*, through the *intercostal* and *diaphragmatic* nerves.

Treatment.—The *warm bath*, and *hot water* to the under part of the body, with *sinapisms* to the extremities, *purgative enemeta*, *cold affusion* to the head and face; slapping the chest and nates with a *wet* and *cold cloth;* exposure to a *sudden current of cold air;* movements of the arms for artificial respiration, taking care to draw the tongue forwards; the vapour of *ether* or *ammonia* applied to the nostrils, and, as a last resource, *opening the windpipe*, embrace all the appliances for resuscitation of the child. During the intervals of paroxysm means must be taken to prevent its recurrence. These mainly consist of attention to the state of the alimentary canal. A searching purgative is generally called for to clear out the contents of the bowels; *calomel*, *jalap*, and *castor oil* are the most useful agents. *Belladonna*, to the extent of one-sixth of a grain thrice daily, combined with *bromide of potassium* or of *ammonium* may be of use. *Sinapisms* and *liniments* to the spine are also of use. The diet ought to be carefully regulated. Change of air is generally called for, and the use of the tepid and cold bath must be daily.

CHOREA—*Syn.*, ST. VITUS'S DANCE.

Natural History.—An irregular convulsive action of the voluntary muscles, of a clonic kind, especially of the face and extremities. The movements are either entirely withdrawn from the control of volition, or but little under the direction of the will.

Cardiac affections are apt to supervene in cases of chorea, differing in kind as well as in degree, namely,—(1.) Rheumatic endocarditis, or pericarditis, resulting in organic change. (2.) Functional derangement and cardiac murmurs, due to an impoverished condition of the blood. (3.) A chronic affection of the heart itself, " evidenced by the existence of a systolic murmur at the left apex, which cannot be referred to inflammation or organic change of the mitral valve, which has not the usual accompaniments of a hæmic murmur, but which does seem plausibly ascribable to disordered action of the muscular apparatus connected with the valve." The structures which most obviously manifest disordered action during life are the nerves and muscles; and for the following reasons we are led to believe that they are maintained in their disturbed and excited state by some morbid condition of the central parts of the brain, and not of the spinal cord, either directly or by reflex action.

(1.) *Clonic spasm*, of the incessantly repeated character peculiar to chorea, is not a phenomenon of persistent spinal irritation; while *tonic spasm* is a mark of such a condition. (2.) The movements can generally be in some measure controlled by the will, unless they are very severe; and even then they are so controlled to some extent. (3.) The spasmodic contractions cease during sleep, whereas phenomena of an excito-motor character are increased by the removal of volition. Fixing the attention also to some other object likewise diminishes the intensity of choreic movement. (4.) The special occasions of increase or of induction of choreic movements, are the attempts at volitional action and emotional changes. (5.) The phenomena of chorea during life tend to refer the exciting cause of the disease to changes going on in the central ganglia of the brain, such changes being expressed in a healthy state through " volition, perception, or emotion, or the balancing and co-ordinating of movements." (6.) Experiments on living animals, and observations in morbid anatomy, tend to prove that injury to the *optic thalami* is productive of considerable disturbance to the movements of the body. (7.) An opportunity was afforded me when Pathologist to the Glasgow Royal Infirmary, of examining carefully a case of chorea, which terminated fatally after a most violent attack, the acute symptoms lasting ten days. The result of the examination shewed decided changes in the *corpora striata* and *optic thalami*, indicated by a difference of the specific weight on the two sides.

A not unfrequent occurrence in the course of chorea, is a high specific gravity of the urine. The high density of the urine is most marked where the choreic movements are most active; and no doubt it indicates increased waste of tissue, consequent on the disturbed state of the muscles and nerves. There is also great excess of urea referable to the muscular waste entailed by the constant convulsive movements.

The essential phenomena of chorea are motorial, consisting of spasmodic involuntary contractions of the muscles—(1.) *Clonic spasms;* of great frequency, unattended by pain, resembling the restless movements of a child who has been irritated or put out of temper. Such spasms occur independently of any attempt at voluntary movements, and are in slight cases almost unobserved. (2.) The patient is agitated by all sorts of odd movements, and has often a vacancy of countenance, which gives him a fatuous appearance. These symptoms are constant during the day, but during sleep they generally cease altogether. They affect both sides, as a rule, and in a very few cases one side only. The patient is then said to labour under *hemichorea*. The health is generally good, pulse natural; and bowels, though occasionally constipated, are by no means uniformly so, but for the most part act regularly. The spasms are generally increased by emotion. The heart acts irregularly, probably owing to the anæmic state generally associated with chorea.

Treatment.—The indications of cure are—(1.) To remove if possible, all morbid states of the body which may tend to aggravate the disease, such as *constipation*, *anœmia*, *amenorrhœa*, *intestinal worms;* (2.) By well-regulated purgative medicines, to subdue any cerebral disturbance; (3.) To sustain the strength and improve the vigour of the nervous system by tonic medicines, by food, and by the cold bath. The particular tonic is not of much moment. The *powder of the black snake root (cimicifuga)*, in doses of from half a drachm to a drachm, or from one to two fluid ounces of a decoction; or from one to two drachms of a saturated tincture, should be given three or four times a day, and continued for several weeks, the dose being gradually increased till it produces headache, vertigo, or disordered vision. The *sulphate of zinc* has also had the credit ascribed to it of curing a large number of cases, beginning with a grain in the form of a pill, three times a day, and increasing the dose till it reaches seven or eight grains daily. The *preparations of iron* have been frequently resorted to with benefit.

The *extract of cannabis Indica* exercises a sedative influence on the muscular action in a marked degree, and that immediately, given in doses of one-fourth of a grain of *the extract* thrice daily. The dose may be subsequently increased to half a grain, and at the same time one-grain doses of *nitrate of silver* are to be administered, and a draught containing eight drops of *dilute nitric acid*. *Arsenic*, in the form of *Fowler's solution*, is well spoken of by Romberg, in doses of three to five drops. *Narcotics* are of great value in the form of *morphine* or *codeia*. *Gentle* applications of the galvanic current along the spine, the patient standing erect, have been successful. The current should be just strong enough to be felt distinctly without pain. Chapman's ice-bags to the spine are also of use. *The tincture of Calabar beans* (ʒi. to ℥i. of alcohol), beginning with twenty minims three times a day, is recommended—the dose to be increased by ten minims a dose to ʒi. *Chloroform* has been used with benefit to control the violent movements.

Of stimuli, *camphor* in five-grain doses has acquired much reputation, especially after the intestinal discharges have become healthy by the action of purgatives. Many young women, who attribute the attack to fright, frequently get well from the simple administration of the *spirit of nitrous ether* in one fluid drachm doses three times a day, combined with the officinal *camphor mixture*. The cold bath, or the cold shower bath, is an excellent adjuvant.

But the best treatment is that by which the improvement of diet is effected with change of surroundings, combined with moral discipline. Hence it is that children with chorea improve so much in well administered hospitals, where the food is abundant and discipline well maintained. Anæmia is constant, and the treatment must be restorative and tonic.

HYSTERIA.

Natural History.—The phenomena of hysteria simulate or mimic the phenomena of almost every other disease, while the most common and characteristic features of the affection are certain motorial changes of a convulsive nature, and usually of paroxysmal occurrence.

A tendency, either congenital or acquired by injudicious training, has an obvious influence upon the induction of *Hysteria*. It rarely manifests itself before the twelfth or fifteenth year of life; and, although it seldom appears in old age, it frequently outlasts the period of child-bearing. The forms and degrees of hysteria are so numerous that the difficulty of describing this disorder is very great. The modifications of age, temperament, states of nervous sensibility, physical and moral education, and grades of society, so influence its aspect that it is only possible to give a mere general outline. It is usually divided into three forms: *first*, that which is characterised by what is termed the "*globus hystericus*," in which the sensation of a ball rising in the throat, or a feeling of suffocation, is experienced by the patient, but without convulsions; *second*, its paroxysmal form, or that in which the *globus hystericus* occurs with convulsions; and, *third*, those irregular and anomalous phenomena which often manifest themselves during the intervals of severe attacks. The milder forms are those which terminate without the formation of the paroxysm or "*hysterical fit.*" They begin with pains in the epigastrium, generally in the left side; or the patient is unusually nervous, and her feelings excited or depressed. These symptoms having existed for a longer or shorter period, the patient experiences the sensation of a ball, the "*globus hystericus*," rising apparently from the lower portion of the abdomen and proceeding upwards to the stomach, thence to the throat, and causing sometimes an intense sense of suffocation. At this point the slighter forms frequently cease, but are followed by headache, stiffness of the neck, general weariness, a profuse discharge of a light-coloured limpid urine, and by great flatulence, the abdomen becoming almost instantaneously distended.

When hysteria assumes a paroxysmal form or "fit," it may be preceded by the pains and mental feelings which have been described; but not unfrequently the attack is sudden, and is often caused by some transitory occurrence. In such a case the patient bursts out into a fit of immoderate laughter or crying, the *globus hystericus* begins to form and to rise, and no sooner reaches the throat than the patient falls to the ground, apparently unconscious and violently convulsed. The fit is now said to be formed, and while in general the convulsions are easily controlled, yet—not only in the strong and plethoric, but sometimes also in delicate-looking slight-made girls—many persons are sometimes necessary to restrain the patient, who writhes her body to and fro, agitates her limbs in various directions, and beats her breast repeatedly with her arm and hand. During the fit the patient may knock her head against the bed or floor, tear her hair, scream, shriek, laugh, cry, or sob alternately. The respiration is slow, and is rendered still more laborious by spasms about the pharynx and glottis, so that the patient often grasps her neck and throat, or rubs or strikes the epigastrium and side with her hand. During this struggle she may bite her own arms or those of the bystanders, and will sometimes move round the room while lying on her back, by means of the muscles of the dorsal region. The abdomen is often singularly distended with flatus; but in other cases the muscles of that region are tense and irregularly contracted. The pulse is, in some cases, increased by the violence of the exertion, but in others its beat is natural. The veins of the neck are distended, the carotids beating with more than usual violence. The face is flushed, and "the head is generally thrown back, so that the throat projects; the eyelids are closed, but tremulous; the nostrils distended; the jaws often firmly clenched; there is no *distortion* of the countenance, and the cheeks are at rest," unless when giving expression to some of the above-mentioned phenomena. The temperature of the extremities is often lower at the commencement than natural, so as to cause a momentary shivering; but as the paroxysm forms, the heat is usually restored and sometimes increased. Various phenomena attend the subsidence of the paroxysm—sometimes a flood of tears, a fit of laughter, or an exclamation, is followed by a great flow of limpid urine, after which the recovery is generally rapid and complete. In other cases the action of the stomach becomes inverted; and the sympathising attendant, perhaps watching the patient with the tenderest care, receives its whole contents over her person, after which the patient may lapse, most unconcernedly, into a profound sleep. In other cases the fit only partially passes off, and the patient lies, to a certain extent, sensible of what is passing about her, perhaps jaw-locked, the secretion of urine suspended, unable to talk, and often obliged to be fed. The fit having entirely subsided, the patient lies exhausted and unwilling to be disturbed, and although more or less conscious of what has passed, she wishes to be thought ignorant of all that has taken place. A want of consciousness may exist when the fit assumes a severe or epileptic form; but this is not a common symptom of the purely hysterical convulsion. In some few cases the patient appears to be delirious, and makes the most extraordinary noises, such as barking or howling like a dog. The duration of the fit is from a few minutes to two, three, or more hours. These fits readily recur, and no sooner is one fit ended than the patient suffers from another; and in this manner the whole attack may last twelve, twenty-four, or even forty-eight hours. In general the intervals are much longer, and not subject to any general law of recurrence, except that they are more common about the period of menstruation.

In the interval between fits, the symptoms are extremely anomalous and irregular, and more strange and difficult to describe than even those of the paroxysm. Some have their senses so acutely alive, that although the window and bed-curtains may be drawn, still they are pained with light, and the slightest noise distresses them. In some, again, the sense of touch is so exquisite that they can scarcely bear the weight of the bed-clothes; and to others odours are similarly intolerable. Besides this extreme acuteness of the senses, others suffer pains under or in the mammæ, known to surgeons as the "hysterical breast," lumbar pains, pains in the hip-joint or knee-joint, headache fixed to one spot, *clavus hystericus*, and palpitation. Pain in the region of the spine is also frequent, and often so intense and so exquisitely increased by pressure that it has often been mistaken for ulceration of the intervertebral cartilages. At least four-fifths of the females among the higher classes who are supposed to labour under diseases of the joints are suffering from hysteria, and from nothing else. The morbid sensibility is chiefly in the integuments, as in the case of the hip-joint, and if they are slightly pinched or drawn from the subjacent parts, the patient complains more than when the head of the femur is pressed against the acetabulum. There is likewise no wasting of the *glutei* muscles, nor flattening of the *nates*, nor painful starting of the limbs. In some instances the patient becomes paraplegic, and is unable to walk, while others suffer temporarily from *hemiplegia*.

TABLE V.—DIAGNOSTIC CHARACTERS BETWEEN HYSTERIA AND EPILEPSY.

HYSTERIA.	EPILEPSY.
1. Unconsciousness, partial, incomplete, and gradual, with sighing, laughing, or sobbing.	1. Loss of consciousness sudden and complete, and therefore no expression of feeling.
2. *Globus hystericus* present.	2. *Aura epileptica* present.
3. Convulsions uniform and clonic—never of the face.	3. Convulsions more expressed on one side, and tonic—countenance distorted.
4. Face flushed, eyelids closed, globe of eye fixed—no grinding of teeth or biting of tongue, pupils respond normally.	4. Face livid; frothy saliva from mouth over lips; eyelids half open; globe of the eye rolls in all directions; with grinding of teeth, biting of tongue, and insensibility of the pupils to light.
5. Paroxysm of long duration.	5. Paroxysm short.
6. Paroxysm followed by wakefulness and depression of spirits.	6. Paroxysm followed by deep sleep; heavy and partially comatose; headache and dulness of intellect.
7. Attack generally during the day.	7. Attack most common at night.
8. Derangement of organic functions of thorax and abdomen, especially of the uterus or of menstruation.	8. Attack sometimes takes place at the menstrual period.

Nausea, *eructations*, *borborygmi*, or *tympanitis*, *palpitation of the heart*, with *syncopal feelings*, *frequent micturition* of clear pale urine, are characteristics of the hysterical state. A certain constitution is also characteristic of the sufferer from hysteria. The external conformation of the features of the face is often of itself sufficient to indicate the existing tendency. The "*facies hysterica*" may be recognised by the remarkable depth and prominent fulness of the upper lip, which is more or less thick. There is also a fulness of the eye, with a tendency to drooping of the upper eyelids.

Treatment.—The treatment may be divided into what should be done during the fit, and into what should be done afterwards.

First,—Loosen everything tight about the person. The window should be opened, and the cold air allowed to blow over the patient, who should then be laid in the horizontal posture on a bed, or on the floor, as a means of rendering the circulation through the brain more equal, and to enable us the more readily to control the convulsive movements of the body. When the jaw is locked, an *enema*, consisting of the *yolk of an egg* beat up with *two drachms of asafœtida*, with half a pint of *water* added, may be administered; or an *enema of turpentine*, in which *half an ounce of turpentine* is similarly mixed with *the yolk of an egg*, and *half a pint of water* added. Another remedy is to fill the mouth with *salt*. The remedy, however, which supersedes all others, and is unquestionably the best, is a good drenching with *cold water*. "I believe," says Sir Thomas Watson, "there is more virtue in *cold water* than in any other single remedy." If the patient lie on the bed, the head should be drawn over its side, and a large quantity of water poured on it from a considerable height out of a pail, jug, or other large vessel, and directly over the mouth and nose of the patient, so as to stop her breathing and compel her to open her mouth. This practice is generally introduced into hospitals; and until it was adopted it was not unusual to see three or four patients in hysteria in the same ward, and at the same time. Under this practice, however, an hysterical case is rare, and the fit seldom occurs twice in the same person, and never becomes epidemic in the ward.

Regulate the bowels by such remedies as may be necessary, and at the same time support and tranquillise the patient by such stimulants as *ether* or *asafœtida*, combined with *hyoscyamus* in the form of tincture, the *syrup of poppies*, or small doses of *morphia*.

If leucorrhœa be present, or menstruation profuse, the *mineral acids*, or the *bitartrate of potass* will be found most efficacious.

The urine is often suppressed for a time after an attack of hysteria; but unless the bladder be sensibly, and perhaps painfully distended, no attempt should be made to draw the urine off. Something more should be hazarded to avoid this necessity; for the catheter once passed, that operation will require to be performed morning and night, perhaps for several months. The use of *Faradic electricity* is most useful in relieving hysterical pains.

NEURALGIA.

Natural History.—Excruciating pain, which is paroxysmal, and returns with renewed violence in a part after periods of temporary remission, constitutes neuralgia.

All neuralgias are symptomatic either of an organic lesion, of which the neuralgic pain is a reflex expression, or the pain is due to a direct organic lesion, involving, compressing, or otherwise irritating various branches of nerves, and so giving rise to pain. In some cases neuralgia is *symptomatic* of various cachexias—e.g., *chlorosis*, *lead-poisoning*, *anæmia*, *malaria*, *rheumatism*, *syphilis;* or it is a *reflex* induction from an acute inflammation, as from a *caries tooth*, a *necrosed bone*, a *tumor*, or a *phlegmon.*

The principal varieties of neuralgia are—(a.) *Facial neuralgia*, *tic douloureux*, or *neuralgia of the trigiminus;* (b.) *Brow ague*, *hemicrania*, or *migraine;* (c.) *Sciatica*, or *hip-gout*; (d.) *Intercostal neuralgia.* But in addition to these there may be mentioned—(e.) *Crural neuralgia;* (f.) *Lumbo-abdominal neuralgia*; (g.) *Cervico-occipital neuralgia;* (h.) *Cervico-brachial neuralgia;* (i.) *Mastodynia*, or *irritable breast.*

Two forms of pain are to be distinguished, namely—one continuous, increased by pressure, confined to circumscribed spots or points in the course of the nerve—usually not a very severe pain, but a very annoying and persistent source of irritation; another form of pain occurs in paroxysms, spreading *from a point* along the course of a nerve upwards and sometimes downwards from a point, and is deep-seated rather than superficial. This kind of pain is terrible, and almost unbearable.

(*a.*) In *Facial neuralgia* the branches of the *trifacial* nerve may be attacked separately or conjointly; most commonly, however, only one branch is affected, less frequently two ; and the case must be severe in which the three branches, or the whole side of the face, are affected. Nevertheless, it sometimes so happens, extending even over the summit of the head, and over the temporal region, by the deep branch of the fifth pair, which emerges to the surface anterior to the external meatus. It is sometimes also associated with a similar affection of the occipital branches at the same time. Next to the sciatic nerve, no nerve is so often the seat of pain as the *trigiminus*—a greater liability to neuralgia arising from two circumstances, namely—(*a.*) The passage of its branches through narrow canal-openings in bones, where they are readily compressed; and (*b.*) from the distributions of the nerve over a large cutaneous surface, more exposed to cold and to changes of weather than any other part of the body. There are especially three points of pain in facial neuralgia,—namely, the *supra-orbital foramen; the anterior opening of the suborbital canal;* and *the mental foramen.* These points lie nearly in a vertical straight line. If the neuralgia be limited to the *first* branch of the fifth pair, the pain spreads in the branches of the supra-orbital, affecting especially the forehead, eyebrows, and upper eyelids, occasionally the eye itself. After this threatening symptom has lasted a few hours or a few days, the patient is seized with a violent darting or shooting pain in the course of the nerve, returning at intervals—phenomena which are characteristic of the disease. The paroxysm is short, lasting only a few seconds or a few minutes; but the pain is perhaps the most severe that the human frame is capable of suffering. Sudden changes of weather are exciting causes of neuralgia.

When the branches, generally of the fifth cranial nerve, are affected, the most painful points are at the exit of the ophthalmic of the superior and of the inferior maxillary branches. Next to those the frontal, and next the parietal, and lastly the occipital, although its origin is independent of that of the triginimal; and whether the triginimal is affected by itself, or the occipital nerve as well, pressure made on the spinous processes of the first two cervical vertebræ always causes shooting pain in the diseased nerves.

(*b.*) *Brow ague*, *hemicrania*, or *migraine*, is a combination of neuralgic symptoms with headache, occurring in paroxysms, and limited to one side of the head and brow. It is apt to commence in childhood and go on to advanced age, occurring in both sexes, but more often in women than in men. In women the attacks are common just before the menstrual period, or during its course. In other cases mental excitement has to do with the attack. The headache is probably due to excitement of the sensory filaments from the trigiminus to the *dura mater*, or to the *sympathetic* filaments accompanying the vessels. It increases rapidly soon after waking in the morning, with chilliness, loss of appetite, sliminess of mouth, sickness of stomach, nausea, and vomiting—sometimes of a bitter greenish fluid, and at last the headache is so intense as to be almost unbearable. The eyes are extremely sensitive to light, and the ears to sound; so that the darkest rooms and most retired are anxiously sought for, and absolute seclusion is desired. The pulse is usually abnormally slow. Generally, no relief is obtained till after a night of sound sleep, the patient awaking next morning free from pain, but much depressed and exhausted. In women it frequently occurs in connection with the menstrual period, or with the commencement of pregnancy, and its tendency is to diminish after middle age.

(*c.*) *Sciatica* is a neuralgic affection of the sensory nerves of the sciatic plexus, composed of the fourth and fifth lumbar and first and second sacral nerves. It is often associated with *rheumatism*—so often that rheumatism is really the most frequent cause of sciatica, with *gout*, so as to constitute a special form of these diseases—namely, *rheumatism of the hip-joint*, or *hip-gout.* Catching cold is also a frequent cause. The pain may result from caries vertebræ, or tumor, or vascular increase, with varicose dilatations of vessels in the intervertebral foramina, through which the nerves pass. The presence of enlarged glands in the pelvis or of pelvic tumors, especially ovarian cysts, fæcal masses in sigmoid flexure of the colon, may also be sources of *sciatic neuralgia.* The disease is most frequent between twenty and sixty years of age, and is more common in males and those most exposed to changes of temperature, than in females and those who are living in ease and comfort.

The most frequent seats of pain are along the *posterior cutaneous nerve* of the thigh, where the posterior and outer part of the skin of the leg becomes painful; the *superficial* branch of the fibular nerve, where the pain is over the outer and anterior surface of the leg and the dorsum of the foot; the *communicans tibialis*, where the pain is in the outer side of the ankle and the foot. The most frequent *points* of pain are behind the trochanters, some parts of the thigh, about the knee-joint, just below the head of the fibula, just above the outer ankle, the ankle-joint generally, and dorsum of the foot.

The disease rarely begins suddenly, but develops itself gradually, and slowly becomes severe. The pain is constantly growing and deeply seated, especially near the ischiatic tuberosity. Tension of the fascia usually makes the pain worse, and the leg is generally flexed, both while in bed or out of it, and from not using the limb, in chronic cases it may sensibly diminish in bulk. Effusion may take place within the sheath of the nerve. It is indicated by a dull, aching, benumbing pain, and a swollen sensation of the limb, succeeding intense pain, cramps, starting, and inability to use the limb. Usually *sciatica* is an obstinate disease, lasting for months or even years, and liable to relapse.

(*d.*) *Intercostal neuralgia* depends on the morbid excitement of one or several spinal nerves (sixth to the ninth), especially those which pass along the upper intercostal spaces towards the sternum, and along the lower spaces to the epigastrium. It is very common, and is met with more frequently in women than in men, especially in the sixth, seventh, and eighth intercostal nerves, and more common on the left than on the right side. It is not unusual after recovery from pleurisy, and may also accompany pulmonary tubercles. It is usually also associated with hysteria and anæmia, especially in women weakened by *hemorrhagia* or *leucorrhœa*. The following points are commonly most painful, namely—The posterior part of the intercostal space somewhat outward from the spinous process, and on the level of the point of exit of the nerve from the intervertebral foramen. The point lying in the middle of the intercostal space, corresponding to the point of division of the intercostal nerve, and from which the nerves pass to the skin. A third point is near the sternum, between the costal cartilages in the upper intercostal nerves; in the lower ones it is in the epigastric region, somewhat outwards from the middle line. These points are generally very sensitive to pressure (hyperæsthesia). *Hard* pressure sometimes relieves the pain. An attack of intercostal neuralgia sometimes just precedes an eruption of *herpes zoster* or *shingles;* and in the intervals of the sharper pangs of pain, numbness, coolness, and formication are occasionally felt.

(*e.*) *Crural neuralgia* occurs where the sensory filaments of the lumbar plexus going to the thigh and leg are affected. The pain is felt along the *anterior* and *inner* surface of the thigh, leg, ankle, and dorsum of the foot, and in the great and second toes. It thus differs from *sciatica*, which is generally along the *outer* and *posterior* surface. It may be due to renal irritation.

(*f.*) *Lumbo-abdominal neuralgia* affects the cutaneous nerves of the lumbar plexus, going to the lower part of the back, the nates, the anterior abdominal wall, and the genitals. The seats of pain are—to the outside of first lumbar vertebra, just above the middle of the crest of the ilium ; to the inner side of the anterior superior spine, and the termination of the nerves towards the *nates* and the genitals generally in the *mons veneris*, *vulva*, or *scrotum*.

(*g.*) *Cervico-occipital neuralgia* arises from excitement of the sensory nerves, originating from the first four cervical nerves, affects the occiput, neck, and nape of neck.

(*h.*) *Cervico-brachial neuralgia* is located among the sensory twigs of the brachial plexus, composed of the lower four cervical and the first dorsal nerves. When the nerves of the brachial plexus are affected, pressure made over the spinous processes of the lower cervical vertebræ gives pain; so also in cases of intercostal, lumbar, or sciatic neuralgia, pressure over corresponding regions produces pain. Thus neuralgia reveals itself by acute pain which corresponds to the origin or point of exit of the implicated nerves, and the pain pretty frequently extends a little farther up along the vertebral column.

(*i.*) *Mastodynia*, or "irritable breast," is a neuralgia of the intercostal nerves, or anterior supraclavicular nerves, going to the mammary gland.

It affects women about the period of puberty, up to the thirtieth year of life. The gland is sensitive to the slightest touch at one or more points; and severe pain occasionally shoots out towards the shoulder, axilla, or hips, and is worse shortly before the menstrual period. At the height of the pain vomiting may occur. The disease causes great anxiety, besides pain; for the patients generally dread a "cancer of the breast," especially if *neuromata* form in the gland. This form of neuralgia may last for months or years without any perceptible change or improvement.

In all these varieties of neuralgia there are certain characteristic symptoms, especially (*a.*) *Cutaneous hyperæsthesia* at the points of exit of the nerve-trunks. More rarely the reverse of this condition supervenes —namely, *anæsthesia.* It is most apt to attend neuralgia apparently of a rheumatic origin, or which is due to a slight lesion of the cord. In such cases, when the *hyperæsthesia* has lasted a long time, it is followed by *anæsthesia*, and sometimes by paralysis. In *herpes zoster* this is apt to occur; also in *sciatic neuralgia.* (*b.*) Certain *superficial tender spots* are also characteristic of neuralgia.

The particular form of cachexia has also a remarkable influence on the seat of neuralgia. In *chlorosis*, *neuralgia* is apt to affect several regions, but notably the *trigiminal nerves* and nerves of the *solar plexus.* In cases of *anæmia* from *uterine hæmorrhages* or *leucorrhœa*, the neuralgia is mainly *gastric* and *intestinal.* In *malaria*, the *supra-orbital branch of the triginminus* is mostly implicated. In *rheumatic cachexia* it is generally the *occipital* and *sciatic nerves;* and neuralgias of rheumatic origin are generally multiple in their manifestation, and frequently alternate with articular pains.

Treatment.—Opiates, *chloroform* and *chloral*, are unquestionably serviceable in mitigating the sufferings of the patient. *Belladonna*, both internally and as a plaister, also sometimes relieves the pain. *Stramonium* and *opium* have a similar temporary effect. *Belladonna*, and perhaps *stramonium*, are better than *opium* as a habitual remedy, and they appear to have done good occasionally. In *facial* neuralgia (not of rheumatic origin) no remedy does so much good as *croton-chloral*, in doses of three grains every two, three, or four hours. *Chlorodyne* is also to be recommended, the composition of which has been determined by the Pharmaceutical Society. The remedies of most value during paroxysms are the diffusible stimulants, such as *sal volatile*, *hot tea*, *quinine* in a full dose, *alcohol* in small doses, *blistering* and *ammoniacal* fluids to the skin immediately over the painful nerves, and the endermic application of a *fifth of a grain of morphia.*

These remedies increase the supply of blood to the painful nerve, and, *pro tanto*, heighten its vital energy. The most speedy way of obtaining a temporary relief is certainly the application of a local stimulant, and more especially of some volatile agent, such as *mustard*, or, still better, *chloroform* diluted with *seven* parts of some simple liniment, such as *belladonna.* A rapidly acting blistering fluid is still more effective. But the more profoundly the general health has been affected, and especially the greater the degree of anæmia, the more necessary is it to join with the use of stimulants (both local, such as above mentioned, and general, such as the *carbonate* and *muriate* of ammonia, taken in *five* and *ten* grain doses respectively), a treatment directed to improve the condition of the blood by "food tonics," such as *cod-liver oil*, *arsenic*, or *steel*, or a combination of some of them, joined with the use of local stimulation, by means of frictions with dilute chloroform, and the manipulations of the scientific "*shampooer.*" The *hypophosphate of soda* is of use, the *phosphorus* of this salt acting directly as a food to the nervous tissue. The subcutaneous injection of small doses ($\frac{1}{6}$ to $\frac{1}{4}$ of a grain) of *morphia* in solution will give temporary relief, and is especially useful to those patients who are obliged to go through an ordinary day of labour.

Another most efficient local application is the alkaloid *aconitina*, rubbed upon the pained part in the form of an ointment, in the proportion of one or two grains to one drachm of lard. *Morphia* similarly used, and blisters, have also often exercised a beneficial effect upon the disease. Holding the head over steam, and the warm bath, are equally or even more beneficial in cases of facial neuralgia. When the neuralgia is superficial, compresses steeped in a solution of *atropia* have a good effect.

Where the causes of neuralgia cannot be removed, modes of treatment which greatly modify the change of tissue and the nutrition of parts are often beneficial. Chief among these is the use of electricity in the form of *Faradisation*, using the electric brush; so that while one electrode, containing a moistened sponge, is held in one of the patient's hands, or against any part of his body, we stroke the brush along the course of the affected nerve; if there are any points very painful, allow the brush to remain over them rather longer.

The best treatment during attacks of *hemicrania* is total abstinence, except perhaps from fluids, to go to bed at once, and refrain from the use of any remedies. When the paroxysm is over, *ferruginous* or *arsenical* tonics are required.

The Treatment of *sciatica* consists in the removal of the causes and circumstances already noticed as producing the disease. In the rheumatic form, the warm baths are most useful, especially the systematic treatment at Neuenahr, Wildbad, Wiesbaden, Teplitz, and Bath. *Iodide of potassium*, in large doses, and *sulphur*, with *guaiacum*, appear to do most good. Of other specific remedies the induced, and still more, the constant current of electricity rarely fails to do good. *Oil of turpentine*, as an electuary, in the following formula—℞. *Ol. Terebrinth* ʒi.; *Mell.* ℥i., of which a table-spoonful is to be taken twice a day, is also very highly spoken of. Fowler's solution of arsenic and other tonics are required.

In cases of *mastodynia*, or "irritable breast," *soap plaster*, with *extract of belladonna*, worn on the breast, may soothe the pain and prevent the gland being touched by the patient, as well as give support to the breast. The following pills are also to be taken:—℞ *Ext. Conii*, *Ext. Papaver*, *a a* gr. ii.; Ext. Stramonii, gr. ¼ to ½.

SECTION VII.—DISORDERS OF THE INTELLECT.

The term *insanity* has not been recognised in the new nomenclature of the College of Physicians; and the subjects hitherto described under that popular term are now comprehended under the above general heading. Six varieties of disorder are thus specified, namely—*Mania* (acute and chronic), *Melancholia*, *Dementia*, *Paralysis of the Insane*, *Idiotcy*, *Imbecility*.

Many theories have been propounded to explain the nature of "*Disorders of the Intellect.*" These may now be resolved into two, namely,—(1.) The *metaphysical*, *functional*, or *spiritual* theory; and (2.) the *cerebral* theory. The *functional* or *spiritual theory*, which inculcates the belief that these disorders imply an affection of the immaterial principle, is at variance with all reasoning, and in direct opposition to positive, well-recognised data. It is an almost universal belief that the brain is the material instrument by which the Mind manifests itself, whether it be by the unseen phenomena of *Conception*, *Judgment*, *Reasoning*, and *Instinct*, or by the more obviously expressed phenomena of *Volition*, *Emotion*, and *Sensation*. To consider those *subjective* phenomena which collectively, in their various manifestations, constitute "mind"—an immaterial essence—as liable to disease apart from all derangement of the material organ—the instrument with which it is so closely and indissolubly united—is to believe in a most incongruous and unphysiological doctrine. The more consistent theory therefore is that which is known as the *cerebral theory;* and which is now entertained by most of those eminent physicians who have made "Disorders of the Intellect" a special study.

The belief which this so-called *cerebral* theory inculcates is, that the instrument through which the phenomena of mind are expressed is the part diseased;—that the encephalic nervous textures are primarily implicated.

MANIA.

Natural History.—Mania, having its origin in disordered emotions, is essentially a disorder of the impulses or propensities in the first instance, tending to more or less "disorder of the intellect (usually of all the faculties) with excitement." One or more of the passions is almost always exalted. There are two forms of the disease—namely, *acute mania* and *chronic mania;* and furious expressions of passion, of prolonged duration, are very generally present in the acute form of this disease. It has, in almost all instances, its stages of incubation. At first there may be only apparently trifling irregularities in the affections. The maniac may be at the outset either sad or gay, active or indolent, indifferent or eager, but he soon becomes impatient and irritable, neglects his family, forsakes his business and household affairs, deserts his home, and yields himself to acts which strikingly contrast with his ordinary mode of life. Delirium and reason begin to alternate with each other. Periods of composure and agitation succeed each other, and so do acts the most strange and extravagant. The kindest love and tenderness of domestic life serve but to irritate and provoke, so that to remain amongst his family excites the patient by slow degrees to the highest pitch of fury. It is seldom in *mania* as in *monomania*, that the patient is insane on one subject only. His mind is a perfect chaos; all is violence, effort, perturbation, and disorder.

In another class of cases the premonitory symptoms are characterised by gloom and despondency, upon which the maniacal excitement supervenes. There is generally a marked departure from the patient's former state of health. *Insomnia* is one of the most important and earliest symptoms. The functions of the body are more or less deranged, and fever, sometimes severe, may prevail.

Special or partial forms of mania are—

(*a.*) *Homicidal Mania*, in some cases the result apparently of delusions, of suspicion, or of implacable enmities against supposed foes. A plausible reason is generally assigned for the attempt to destroy life; the victim is represented as having systematically annoyed, or irritated, or conspired against the lunatic. In other cases the attacks are the offspring of momentary, uncontrollable impulse, without cause *quoad* the persons assaulted. The pretext for assault is then frivolous in the extreme.

Such homicidal impulse and attempts of the most persistent and dangerous kind may co-exist with a perfect knowledge of right and wrong, and their bearings on human actions—with perfect ability also to manage business affairs, though of a complex pecuniary character—with perfect propriety in maintaining most of the relationships, or of discharging most of the social or public duties of life—with deportment often the most polished and gentlemanly, the most considerate and kind. (*b.*) *In Suicidal Mania* there is an irresistible propensity on the part of the patients to destroy themselves, a propensity often developed in connection with *religious melancholia*—a form most difficult to eradicate or conquer; and, from its inveteracy, the forerunner of incurable forms of disordered intellect. (*c.*) *Pyromania*, as when the derangements of the emotions and of reason may take the form of arson. (*d.*) *Kleptomania* is an irresistible desire to steal. (*e.*) *Monomania* is a term which comprehends various phases of intellectual disorder, attended with *delusions;* and it is directed by the College of Physicians that cases of so-called *monomania* are to be classed under *chronic mania*, or *melancholia*, according to their character. There is generally an undue intensity and exaltation of the conceptive and perceptive faculties. This disorder of intellect is more or less partial, that some one passion or idea so entirely possesses the patient as often to lead to dangerous conduct. The modes by which the monomaniac gives expression to his particular *delusion* are endless; and the mental affliction is especially indicated by *delusions.* (See pages 236 and 237, *ante.*) The "symptoms of delusion are still accepted in our courts of justice as the most authentic mark of insanity, and as the essence of cerebro-mental disease."

Hallucinations or *delusions* sometimes occur when the organ is itself destroyed through which they would be *objectively* expressed, thus shewing their *subjective* nature—*e. g.*, blind people see visions, and the deaf hear sounds, the *hallucination* being a false conception which the patient could not distinguish from a true perception. The images thus excited are described as vividly as those produced by objective causes; so that the patient, when insane, entirely believes the empty and false forms he sees, the ideal sounds he hears, to be real and substantial. Nothing can persuade him of the non-reality of any one of them. In cases of disordered intellect, if a part of the body be diseased, the imagination often personifies the local lesion into some strange reality.

MELANCHOLIA.

Natural History.—A state of melancholy is often the first indication of mental disease, as a disorder of the intellect with depression, and often with suicidal tendency. It may precede *mania*, and it is associated with or supervenes upon other forms of disorder of the intellect. It may come on suddenly, as when it is the immediate consequence of grief; or gradually, as the mere exaggeration of a naturally melancholy frame of mind. Sudden melancholia is rare. Premonitory symptoms generally indicate a period of incubation more or less prolonged and sufficiently obvious. A state of depression often follows upon a state of *mental elation*, or on prolonged mental exertion and occupation, which suddenly ceases. It also succeeds the mental exaltation produced by inebriating drinks. These effects, however, are generally slight and transient, and the cases of this kind ought to be separated from those cases in which the depression becomes persistent; in which the "relish for existence" becomes less and less, the spirits become depressed, and the man feels unequal to the ordinary duties of public life. In the domestic circle he becomes silent, and seeks entire solitude. His propensities are to indolence and general indifference. He reads nothing, writes to nobody, shuns all exertion. One dominant propensity alone is too often active—namely, self-destruction; while obstinate abstinence from food and drink is a common feature. There is greatly increased susceptibility of the emotions, so that trivial circumstances easily move to tears; all consolation being disregarded. Occasional remissions of the affection may deceive the patient's friends for a time; but the disease progresses till the patient is either placed under the care of competent guardians, or he voluntarily seeks the tranquillity of an asylum. Fortunately for the chances of cure, a love for and appreciation of the ridiculous is often associated with the tendency to *melancholia*. The ultimate course of cases of *melancholia* tends to pass into *dementia;* but the tendency thereto is much less marked than in *mania*. The prognosis is more favourable in simple *melancholia* than when complicated with other disorder of the intellect. Among the earliest *mental phenomena* are—forgetfulness, abstraction, simple depression of spirits, alterations of the affections towards children or other near and dear relations, restlessness, religious dreads, delusions, alterations of the instincts, such as hunger. "Among the earliest *physical symptoms* of melancholia are loss of sleep, and disturbed dreams. The digestive organs are frequently deranged, the tongue is unnaturally red or loaded, sometimes flabby, pale, indented at the edges; there is fulness at the epigastrium, the alvine evacuations are deficient in bile, a fixed dull pain, or an ill-defined sense of oppression is often experienced in the head. The pulse is generally slow and compressible. The urine pale, sometimes high coloured, depositing lithates. The skin is usually harsh, but not unfrequently it is moist and clammy. The uterine functions are more or less disordered, and in a large majority of cases are suspended. In men the reproductive instinct is in abeyance." The attitude is characteristic. The head is bowed on the chest; answers are given to questions with effort and in monosyllables, or after a considerable pause. The patient is apathetic, taciturn, or absolutely silent.

This disease comes next in frequency of occurrence to *mania.* It is often hereditary; and all its varieties are disposed to be remittent.

The special forms which *melancholia* assumes are—(1.) *Religious;* (2.) *Hypochondriacal;* (3.) *Nostalgic.*

In *religious melancholy* the impress is given to its character by the religious tendencies of the patient. In *hypochondriacal melancholy* the morbid mental state is expressed by the *exaggeration or increase to a morbid degree of intensity*, of that property which every one possesses of creating around him, or within himself, sensations which are not the result of external impressions or corporeal conditions; but which, having their origin in the mind (subjective) are represented and appreciated by the material organs of the body. It consists essentially in the transference of a phenomenon (subjective or mental in its origin and essence) into what appears to be a real material change, appreciable sometimes by others. It is often expressed by the sense of touch, combined with a morbid imagining, so that the patient believes himself to be strangely metamorphosed, changed into some inanimate thing, or he loses all knowledge of his personal identity; and this form of disease is sometimes combined with other *delusions.*

The affections are, as a rule, subverted, and those who ought to be most dear to the patient by the ties of relationship become most hateful. The mind is commonly swayed by some destructive passion to effect some object criminal in itself. *Hypochondriasis* is often one of the worst concomitants or sequelæ of dyspepsia; and when disorders of the intellect assume the form of *hypochondriasis*, and are at the same time associated with real lesions of the body, the complication is often very embarrassing to the physician, from the disturbed, exaggerated, or false statements of the patient.

Nostalgic Melancholia (*nostalgia*) makes itself obvious by an inordinate desire to return to one's native country when far away from home, and to which is added the apprehension, on the part of the patient, that he may never be able again to see his native land. The prophecy of the inspired writer (Jer. xxii. 10) seems ever ringing in his ears,—"Weep ye not for the dead, neither bemoan him; but weep sore for him that goeth away: for he shall return no more, nor see his native country." Army surgeons often witness such cases of home-sickness. Decided aberration of mind is present, expressed by exaltation of imagination, especially in extravagant delusions respecting home. This mental excitement is accompanied by increased heat of the head and acceleration of the pulse. There is redness of the conjunctivæ, and unusual movements of the patient are frequently observed. Uncertain pains occur in various parts of the body. There is a general feeling of oppression and weariness; an inability to fix the attention; and conversation is apt to be unconnected. A sense of weight and pain pervade the viscera. Under these circumstances prostration of strength ultimately becomes extreme, mental depression keeps pace with the decline of the body, the patient lies weeping, sighing, or groaning, and a propensity to suicide is not unfrequent when the debility becomes extreme. General paralysis is common; but death is the result of a gradual exhaustion of the vital powers. The Dutch, the Swiss, the Highlanders, and the Irish, are those soldiers amongst whom this form of insanity has been mostly noticed, and the disorder is apt to be prevalent during extreme height of the barometer.

DEMENTIA.

Natural History.—A disorder of the intellect characterised by loss or feebleness of the mental faculties is expressed by dementia. The deterioration of mental function, extends from failing memory and slight confusion of thought onwards to utter fatuity. Some dements have previously suffered from *melancholia*. Some have been *maniacal*, others have suffered from the severe delirium of fever or sunstroke; but after a partial recovery from these immediate affections, by slow gradations the mental faculties become dulled, confused, and finally obliterated. Others, again, lose their faculties by reason of extreme old age—*senile dementia*. Feebleness is the essential characteristic of this form of intellectual disorder; and there is abolition, more or less marked, of all the sensitive, intellectual, and voluntary faculties. If dementia is long continued, its outward signs are—a vacant and puzzled look, a lack-lustre eye, a weak smile, a meaningless laugh. Dements may become paralytic, a thickness of speech being the first symptom of its approach, followed by a loss of power in the limbs of one side, more marked in the lower extremity, so that the step is feeble and straggling. In the last stage they may present the phenomena of—

PARALYSIS OF THE INSANE—*Syn.*, GENERAL PARALYSIS.

Natural History.—A form of general paralysis in which the cineritious substance of the brain is the seat of cloudy swelling of its minute elements, the brain-cells, with lesion of minute blood-vessels and increase of connective tissue, tending to peculiar disorder of the intellect, general failure of nerve power, muscular debility, frequent blood extravasation (hæmatoma), convulsions of the nature of apoplexy and epilepsy combined, and to involvement of the whole brain in degeneration and atrophy, so that general and complete paralysis of body and mind results. Muscular debility from general failure of nervous powers rather than motor paralysis, characterises this disease; and so far muscular power in this and some other diseases of intellect has been described as the "*pulse* of insanity." Delusions of grandeur prevail, and a form of convulsions between apoplexy and epilepsy are common, but not constant phenomena. The nomenclature of the disease—"*General Paralysis of the Insane*"—is unfortunate. "An *acute cerebro-meningitis* with paralysis is found in the ordinary category of diseases treated by the general physician; whereas a *chronic cerebro-meningitis*, attended by a slower derangement of the bodily and intellectual faculties, is styled "*general paralysis of the insane*," and is ignored by the same physician and handed over to the alienist. "The general *paralysis of the insane* is a disease which has an appreciable morbid anatomy; and when cerebral diseases are classed on a pathological basis, it comes under the domain of the ordinary physician; but since the mind suffers in a more chronic manner than in most of the other affections which are seen by such practitioners, this complaint is in practice treated chiefly by the alienist." There are, however, many reasons for drawing a line between this and other mental affections. Thus, it sometimes arises from a definite cause, such as an injury, in a person not predisposed to insanity; it runs a certain course of not many years' duration, and it may attack a brain previously sound. Cases of the disease are on record where the general paralysis followed —(1.) injury; (2.) dementia; (3.) where it was not attended with any exalted ideas; (4.) where it existed without mental symptoms; (5.) where maniacal symptoms accompanied the general paralysis. It seems to be a distinct species of paralysis, rather than a mere variety of disorder of the intellect.

Whether the disease commences suddenly or gradually, one of the earliest phenomena is a feeling of weariness of the lower extremities—weariedness after little exertion. The gait also soon becomes peculiar and characteristic, as the patient walks "to and fro"—"to and fro"—without any definite object, but an expression of restlessness, which indicates the desire to continue the movements. As the disease advances, more attention is paid to the walk, so that the centre of gravity is maintained with great care, and the patient moves with caution and studied attention, looking neither to the right hand nor to the left. The step is characteristic. The foot has no elasticity of motion, but comes down flat upon the ground. The steps are shuffling and short, while the legs are thrown outwards and apart, and the patient straddles rather than walks. Perfect co-ordination of the muscles of the lips first begins to fail, indicated by slight tremulousness; and a feeling of stiffness in the lips may be complained of. As a consequence there is hesitation in articulating words, and particularly of words with labial letters. Afterwards, as the disease progresses, any attempt at speech induces convulsive movements of the corners of the lips, twitches or quivering of the upper lip, and contractions of the chin. The head at the same time is nodded shortly and sharply, as if to aid expression. The speech soon progresses in difficulty: it becomes thick, like that of a drunken man, until articulation is impossible. The face becomes devoid of all expression. It is mask-like, or like a curtain—a perfect blank of thought and feeling. If the patient is asked to put out the tongue, he involuntarily raises his hand to his head, as if to aid the effort; but the mouth is then merely opened, and if the tongue is protruded, it is done in a jerking way, and it trembles greatly. When the patient is made to stand erect, he appears to balance his weight on both legs as equally as possible. He cannot "stand at ease," and the position of the arms and hands is constrained. In sitting, the attitude is square, squat, and graceless, the head droops slightly, the thighs are held parallel, and the knees bent at a right angle, each hand resting on a knee or on the elbows of a chair.

It sometimes happens that muscular feebleness exists for some time before mental imbecility betrays itself; but when disorder of intellect manifests itself, it is characterised by delusions of a peculiar kind, such as the possession of good fortune, great wealth, high birth. The animal spirits are exuberant; there is general contentment and good humour, except when thwarted or contradicted, when an outburst of ungovernable passion is apt to be induced. The temper is extremely irritable and uncertain, while the views held for the time and expressed vary from day to day. The delusions also are apt to be characterised by suspicion, with continual fear of assassination or injury. When the invasion has been gradual, the intellect becomes slowly weaker and weaker; the will becomes feeble and purposeless; the memory treacherous and fails, so that words are omitted in speaking and writing, or sentences are repeated. The pupils may be contracted at first, with subsequent irregularity, and the *irides* variously susceptible to light. Anæsthesia may exist, with impairment of tactile sensibility. The handwriting is greatly altered, needlework is clumsily done, so that with much fumbling the thread is got and held with difficulty, and often dropped; and all acts of delicate manipulation requiring a keen sense of touch become impossible. The patients are apt to fall and to be much knocked about without feeling pain, and sometimes clumsily pull the features of their face with their hands.

The first evidence of impaired excito-motory functions is imperfect deglutition, the mouth being filled and the food kept there, or rolled from side to side. There is danger also of its becoming impacted in the pharynx, and so choking the patient. That reflex action is also weakened, is shewn by the fact that the soles of the feet may be tickled without causing reflex muscular movements. The sensitive irritability of muscles to electricity is sensibly impaired or altogether absent. In the last stage of the disease there is a constant tendency to gather up the bed-clothes and roll them over, and all instinct of decency is lost. Death generally takes place suddenly, as from meningeal apoplexy, during or after one of the convulsive attacks, or by asphyxia. If he survives such an apoplectic attack—and as these attacks of convulsions between epilepsy and apoplexy are frequent—layers of effused blood become organised, and *hematoma* of the dura mater are often met with after death in this disease.

This general paralysis of the insane steadily advances from bad to worse, but with occasional remissions in the symptoms; and hence it has also been named "*progressive general paralysis.*"

The average duration of the disease is about thirteen months; few survive three years; and it is seldom protracted beyond four or five.

SECTION VIII.—GENERAL DIAGNOSIS OF DISORDERS OF THE INTELLECT.

The premonitory indications of cerebral mischief consist of morbid alterations of temper, depression of spirits, amounting sometimes to melancholia; headache, severe giddiness, inaptitude for business, loss of memory, confusion of mind, defective power of mental concentration, the feeling of brain lassitude and fatigue, excessive *ennui*, a longing for death, a want of interest in pursuits that formerly were a source of gratification and pleasure, restlessness by day and sleeplessness by night. Any one or more of these symptoms obviously indicate an unhealthy state of the functions of the brain and nervous system; but their insidious mode of approach, and the unwillingness of friends to believe that anything is wrong with a relative, rarely, if ever, permit the symptoms to attract attention till some phase of disorder of intellect becomes unmistakably developed.

To obtain a correct and early diagnosis, one "*only safe rule*" is to be observed—namely, a close and thorough appreciation of the physical and mental aspects of the existing condition of the presumed lunatic at the period of his supposed insanity, compared with his prior physical and mental manifestations, which were regarded as his natural and healthy state, and which had not been observed to be different from those of other men—"*a comparison of the individual with his former self.*" The necessity of making the mind of the individual patient, and not that of the physician, the standard of comparison by which to determine the sanity or insanity of the patient, cannot be too strongly urged. The man must be the measure of himself; and this principle is found to be of universal application in all physiological and pathological investigations. For example, before the physician can judge of the condition of the urine passed by a man in disease, he must know the conditions of that man's urinary excretions when they are in a normal state. So, also, before the physician can judge as to the impairment or disorder of intellect in a given individual, he ought to acquire or possess some knowledge as to his intellectual capacity previously. If mental phenomena are ascertained to exist of a morbid kind, compared with those which have been expressed before, and especially if there be any characteristic symptom of cerebral lesion, the individual may be fairly deemed insane, and, if so, he is legally irresponsible for his acts.

The following rules ought to be adhered to in diagnosis:—

(1.) Learn as thoroughly as possible the antecedents and history of the patient. (2.) Estimate the value of the hereditary tendency. (3.) Ascertain if there has been any change of habits or disposition. (4.) Exercise the greatest tact and discretion in the personal examination of probably insane patients, and obtain an introduction to the patient in as natural a way as possible. Above all, avoid commencing any conversation which will tend to divulge the object of the visit. (5.) Observe any peculiarities of residence or of dress. (6.) Study the appearance, demeanour, and general conduct of the patient. (7.) Notice any peculiarities of bodily condition, as regards plumpness or emaciation, the state of the skin, the pulse, the tongue, the temperature of the body, and condition of the eye, as indicating impaired bodily health. (8.) Observe any peculiarities of gesture, and the expression of the countenance of the patient. (9.) In medico-legal cases of all kinds, including questions regarding disorders of the intellect, let the physician avoid becoming a partizan. He ought never to permit his evidence to be led on matters of opinion, either directly or indirectly, by counsel on either side. "Facts observed by himself" are the elements on which alone his reputation can be safe in a witness box.

SECTION IX.—TREATMENT OF DISORDERS OF THE INTELLECT.

The treatment of these disorders resolves itself into the *medical* and the *moral* method. Medicine indirectly acts upon the brain, as it does upon other organs, so as favourably or unfavourably to influence the course of disease. It may regulate the different actions and secretions of the viscera of the body, and thus improve the general health, so that the happiest results are often obtained by the early and judicious use of medicinal agents in the treatment of all disorders of the Intellect. But no uniform method of treatment can be taught.

Leeches to the *vulva* and thighs are often beneficial in cases of *mania*, *monomania*, or *melancholia*, concurrent with the menstrual period; and to the *sphincter ani* in those cases obviously connected with suppressed hæmorrhoidal bleeding or hepatic congestion. In some instances leeches may be applied with benefit to the Schneiderian membrane, particularly in those cases occuring in early life, and in persons of plethoric constitution and of sanguine temperament. Illusions of hearing or of vision, which had embittered the patient's life, have been removed by leeching behind the ears or over the superciliary ridges. In *acute mania*, prolonged hot baths are of use. The patients remain from eight to fifteen hours in them, at 82° to 86° Fahr., whilst a current of water at 60° is continually poured over the head. Packing in the wet sheet and warm baths, with cold to the head, will often procure sleep more certainly than medicines of the sedative or hypnotic class. *Sedatives*, or agents which modify directly the condition of the cerebral tissue, constitute very valuable remedies. In recent acute cases they are generally admissible; but it is in the various chronic forms of *melancholia* that they are most useful.

In suicidal insanity, when local cerebral congestion is absent, and the general health and secretions are in good condition, the *Bi-meconate* and *Hydrochlorate of morphia* often act like a charm, if *uninterruptedly and perseveringly given* until the nervous system is completely under their influence. Success from the use of sedatives often depends upon a *ready adaptation of the form of sedative to the description of case in which it may be deemed admissible, and a judicious admixture of various kinds of sedatives.* With respect to *opiates*, that medicine which will allay watchfulness in one may not in another, but, on the contrary, increase it. This is particularly the case with opium, which is rarely found admissible in insanity in its crude state. It more frequently creates heat and general febrile action than sleep. In cases, however, of recent excitement, *morphia* in considerable doses has been found most beneficial. So also will *chlorodyne* and *chloro-morphine* be of use in some cases, as well as *chloral* and *croton-chloral.*

Indian hemp is an extremely useful sedative, not hitherto appreciated sufficiently. It relieves pain, is *soporific*, *anodyne*, *antispasmodic;* and while conducing to sleep, promotes at the same time *diaphoresis* and *diuresis*, without producing headache, vertigo, constipation, or impairing the appetite. The dose varies from *one-sixth to one-half grain for a child*, and from *one-third to one grain and a half for an adult.* In cases of mental or emotional disturbance it will be found extremely useful, especially where there is deranged cerebral circulation, with pain and delirium; in cases of incipient insanity after fever or *sunstroke;* and in cases of *senile ramollissement. Digitalis*, *conium*, and *belladonna* have been extensively employed as calmatives.

Endermic medication and *hypodermic injection* in insanity offer numerous advantages. Preparations of opium introduced into the system by the hypodermic method, are more speedily manifested by the results than when administered by any other mode. The *acetate of morphia* is the best form to use, with a minimum of *acetic acid* in hot distilled water, in the proportion of *five* grains of *acetate* of *morphia* to one fluid drachm of water or of glycerine. *One minim* of this will represent $\frac{1}{12}$ of a grain—a safe and useful minimum dose. *Two minims*, equal to $\frac{1}{6}$ of a grain, is the best commencing dose for relief of severe pain, and as a hypnotic in states of nervous irritability, whether connected with disorder of intellect or other diseases. *Three minims*, or $\frac{1}{4}$ of a grain, is *an unsafe dose* TO COMMENCE WITH; dangerous and even fatal results have resulted from such a dose. Such a dose should not be given till smaller doses have been tried. Used *endermically*, the salts of opium are reckoned to be three times as powerful as when swallowed.

Hydrate of chloral is of use in subduing the delirium of mania, and sometimes in obtaining sleep. *Purgatives* may be regularly required. When the bowels are constipated, the form is best determined by the state of the tongue, and sometimes by the idiosyncrasies or proclivities of the patient in regard to medicine-taking. Supposing the tongue to be white and coated, the *sulphate of magnesia*, or other neutral salt, combined with *tincture of hyoscyamus*, in the proportion of ʒj. of the former to ♏ xv. to ♏ xxx. of the latter, in *camphor mixture*, is a formula to be recommended. If, on the contrary, the tongue be clean, the cathartic should be given with some slight bitter, as the *infusion* of *orange peel* or of *gentian*. In some cases the bowels are not only exceedingly obstinate, but the patient may be greatly adverse to all medicines. In such cases one or two drops of croton oil placed on the tongue or introduced in food produces free evacuations.

As to the moral treatment, the first important rule is to remove the patient at once from his family:—*in slight cases*, in order that he may be induced to exercise such command over himself as he possesses, and to remove him from influences which may have been aggravating his morbid state: *in severe cases*, in order to prevent his doing mischief either to himself or others. The main feature in the moral treatment of the insane in this country is the abolition and absence of mechanical coercion or restraint. The beneficial action of this system, generally known as "*the non-restraint system*," is now thoroughly recognised in England and Scotland, where it has been gradually established in every asylum since 1847-48. In certain conditions of excitement, however, it is proper to place the patient at once in a darkened room, remote from noise and from the means of injury to himself or others, and so that as few objects as possible may irritate him, just as a patient with his eyes affected is kept in a darkened room. The effect of such seclusion is generally of a soothing character; and in not a few cases of periodic mania it is eagerly sought by the patients themselves.

The patient should be induced, if fit, to undertake some manual labour, or some office in the asylum or household, which, by amusing his mind, will invigorate his body and greatly tend to restore the healthy working of his brain. There are no more powerful medicines than "Occupation," "Recreation," and "Education." Occupation should be such that no time is left for idleness, or for sitting brooding over morbid fancies. The curative results of well-chosen means of recreation cannot be over-estimated. When the circumstances of the patient admit of it, travelling, which embraces change of air and change of scene, as well as exercise, is often highly salutary in incipient cases; and much has of late been done by the judicious introduction of music and other amusements into asylums. Thus, concerts, balls, conversaziones, evening entertainments, pic-nics, excursions, *fêtes champêtres*, athletic games, pedestrian excursions, public amusements in towns, and carriage drives, are all legitimate and well-approved means of maintaining a constant and varied succession of recreation adapted for all classes of the insane. When reason is restored, and the affections again fix themselves on their natural objects, *and when the emotions are under control*, the patient may be allowed to see his friends, and have his attention directed to the affairs and interests of his family; but it should be remembered that the mind remains weak and enfeebled for some time after apparent recovery: and consequently the patient's restoration to society should be gradual.

CHAPTER XI.

DISEASES OF THE EYE.

SECTION I.—DISEASES OF THE CONJUNCTIVA.

CONJUNCTIVITIS—*Syn.*, OPHTHALMIA.

Natural History.—The conjunctiva is the mucous membrane of the eye, and begins, as the immediate continuation of the skin of the face, at the edges of the eyelids. Like other mucous membranes, it forms a surface communicating with, and to a very considerable degree exposed to the external air. It is liable to become inflamed. The structure generally is that of mucous membrane, the component parts being mainly connective tissue corpuscles, and the loosely shreddy bundles of fibres of intercellular substance lying between. These connective tissue corpuscles are generally found to be the centres where morbid processes commence in the conjunctiva, especially those of *proliferation*, which may be so luxuriant, and the morbid products so great, that the interspaces of tissue may be completely filled up with new growth, which sometimes undergoes fatty degeneration. The products of growth are always greater in the superficial than in the deep layers. The outermost layers thus become constantly loosened; and the excretion of new material the more extensive, the more rapidly the process runs its course, and the more luxuriant is the *proliferation* of tissue. As the process increases in severity, the elements become more and more removed from the characters of epithelium, and are gradually changed into *mucus* or *pus-corpuscles.* The characters of the secretion also change. It no longer mixes with the tears, but is a thick and transparent material, which rolls up into balls. As the process becomes more severe the secretion becomes opaque from pus, and may be a whitish-yellow or green-grey colour (*catarrhal*).

Conjunctivitis, or *ophthalmia*, has been distinguished into—(1.) *catarrhal;* (2.) *pustular;* (3.) *purulent;* (4.) *gonorrhœal;* (5.) *strumous*, and (6.) *chronic*.

The most striking and prominent symptom common to several or to all forms of ophthalmia is the "*redness of the eye*," caused by the various kinds of increased vascularity. It varies as to tint and as to the arrangement of the blood-vessels which appear on the surface. It is usually of a *bright scarlet* colour in simple conjunctivitis, which may affect the *ocular* or *palpebral* conjunctiva alone, or may involve the sub-conjunctival tissue, or the sclerotic also. It varies in degree, is usually irregularly distributed or diffused in patches, some fasciculi of vessels being more distended than others; but when the inflammation is intense, the vascularity may be so great as to obscure completely the colour of the "*white of the eye*" (the *sclerotic*), so that the whole surface, except that of the *cornea*, becomes of a scarlet red. As a rule the redness is most considerable over the palpebral conjunctiva and at the *fornix*, whence it advances gradually towards the *cornea*. The blood-vessels of the ocular conjunctiva and of the sub-conjunctival tissue, thus rendered visible by inflammation, anastomose freely with each other, and so form a network over the conjunctiva, which can be made to glide to and fro on gently rubbing the conjunctiva against the sclerotic; or, the network of vessels "can be slipped and dragged about over the adjacent surface by moving the eyelids with the finger." In this way the share which the conjunctival vascularity takes in the general "*redness of the eye*" can be recognised. Varicose conditions of the capillaries may occur, which may spontaneously rupture, as during coughing, when a red non-vascular patch will denote the site of extravasated blood. It is then commonly called a "*blood-shot eye*," meaning thereby *ecchymosis*. Such *ecchymosis*, or blood-shot condition, occurs spontaneously in some persons; and then, though harmless in itself, it ought to be taken as a sign or hint that there may be morbid changes of blood-vessels in other parts.

In contradistinction to *conjunctival* redness, the redness of the *sclerotic*, as seen through the *conjunctiva*, must also be recognised by its appearance and by the arrangement of its vessels. The *tint* of the redness is different from the vascularity of the conjunctiva, and two kinds of "*sclerotic redness*" are to be distinguished, namely—(1.) Delicate pink or red patches—indicating circumscribed *sclerotitis* or morbid changes in the iris (*iritis*) or *ciliary* processes. If the redness surrounds the margin of the *cornea* like a halo, over which the conjunctiva is easily made to slide, forming a zone of *sclerotic* redness, it is known as a "*sclerotic zone*" or "*ciliary redness*," and indicates undue vascularity of the parts within, especially of the *ciliary processes*. The vessels are small and fine, like hairs, radiating and straight. They cannot be made to shift their place by any dragging of the lids. (2.) Redness due to large blood-vessels emerging from the interior of the eye through the sclerotic, in the ciliary region, especially in front of the sclerotic insertion of the *recti* muscles, one generally from the *rectus externus*, and two from each of the other *recti*. These vary in number, and may be of hair-like thinness, or large and varicose. Such forms of vascularity are met with most frequently in the chronic stage of *arthritic ophthalmia* in *chronic glaucoma*, *hypermetropic*, and *presbyopic* patients, where the eye is subjected to much fatigue.

When the vascular ocular conjunctiva and sub-conjunctival tissue next the cornea become swollen, the lesion is termed "*chemosis*" (from χημα, *hiatus*—a gap or hollow), and the swelling may be so great that the swollen vascular conjunctiva overlaps the cornea, which thus lies in a hollow or pit, and may be quite hidden from view—the swollen vascular tissue protruding from between the lids, and preventing their being completely closed or opened. The condition is accompanied with pain and heat. The material causing the swelling of *chemosis* may be blood, serum, or both, escaped from an incision, or it may be a fibrinous solid *chemosis*, by infiltration of lymph or fibrine, as in the acute stage of *diphtheritic ophthalmia;* and it always indicates a high degree of inflammation.

Œdema of the conjunctiva, or infiltration of its non-vascular tissue with fluid, is observed in the course of *Bright's disease*, and in simple catarrhal ophthalmia in weak persons. A *discharge* of fluid flows from the inflamed *conjunctiva*. It consists of decomposed intercellular substance, with different kinds of cells, *epithelium* (old or young), *mucous* cells (with turbid contents—*cloudy swelling*—and small nuclei), *pus cells*, incompletely developed *nuclei*—fatty degenerated pus cells and nuclei. If the discharge contains pus it is generally contagious. The discharge varies in consistence: it may be viscid and transparent, as in chronic catarrhal ophthalmia. In the acute form, it is viscid, transparent, and streaked with grey at the commencement; it is opaque and streaked with yellow grey when inflammation has reached its height. The more acute and severe the inflammation, the more abundant, thinner, and less viscid is the discharge. The more viscid it is the less will it mix with the tears, and will only do so when it becomes greenish, yellow, opaque, and fluid.

Intolerance of light (*photophobia*) and spasmodic *closure of the eyelids* are generally most expressed when the *cornea* becomes implicated; and very slight morbid changes will often produce the most intense *photophobia*—the instinctive or reflex desire to exclude the light causing the spasmodic closure. This spasmodic closure may be subdued by the application of *tincture of iodine* to the skin of the eyelids twice a week—taking special care that none runs into the eye; also by the insertion of a seton in the skin of the corresponding temple. *Watering of the eye*, *profuse flow of tears* (*lachrymation*), is also most expressed when the *cornea* is implicated, as by a minute superficial ulcer, inflammation, or pustular corneitis. The forcible opening of the eyelids will then be followed by a gush of hot and scalding tears, discharged from the outer and upper part of the fornix, where most of the lachrymal ducts open on the conjunctiva. Pain during conjunctivitis, if severe, is a sign of implication of the cornea by ulceration or suppuration; and its sudden appearance and sudden subsidence, after six to twelve hours in *diphtheritic ophthalmia* suggests perforation of the *cornea.* Implication of the cornea and changes in the eyelids may happen at any stage.

Treatment must be directed to the purulent discharge, whatever may be the condition of other parts, by caustic and astringent remedies. A most useful lotion is the following, in mild forms of the disease:—

℞. *Aluminis*, gr. xxx.; *Spr. Vin Rect.*, *f* ℥ ss.; *Aq. Rosar.*, *Aq. ad* viii. *misce.*

CATARRHAL OPHTHALMIA.

Natural History.—Inflammation of the conjunctiva and the Meibomian follicles, characterised by the secretion of a varying amount of turbid, mucous, or of muco-purulent material, the discharge of which is considerable, with some hyperæmia and swelling, constitutes catarrhal ophthalmia.

If the *sclerotic* also seems unduly vascular, a rheumatic condition may be associated with the ophthalmia, which has been named *catarrho-rheumatic ophthalmia*, to indicate the morbid combinations. The conjunctiva becomes vascular, generally first at the inner canthus, and in slight cases confines itself to the *palpebral conjunctiva*, or to the *semilunar fold* and *caruncle.* In severe cases a uniform redness of the *ocular* and *palpebral conjunctiva*, obscuring its large vessels, is observed. There is a reticular injection of the ocular conjunctiva; and in the severest forms the whole conjunctiva is reddened of a light hue, so long as the symptoms of irritation only predominate. The swelling, chiefly seen in the *semilunar fold* and *caruncle*, rarely amounts to *chemosis*, and in weak persons *œdema* of the lids may appear; but there is no intolerance of light unless the *cornea* becomes implicated. The discharge at first is viscid and clear, with a few opaque flocculi, which causes it to be streaked with grey. It is composed of fully but ill-developed epithelial cells, with one, rarely with two, nuclei and mucous cells; and during the acute stage mucous and pus cells with ill-developed epithelial cells. It then becomes opaque and yellow. At first the pus is not abundant, and it may generally be seen lying in the angle between the eye and the lower lid upon pulling the lids apart; or it makes itself visible at the corner of the eye; or between the eyelashes, along the edges of the lids. In chronic catarrhal ophthalmia it becomes transparent and viscid. It does not mix with the tears, the flow of which is not increased unless the cornea is implicated.

"Stiffness of the eyelids," and a sensation as if "sand had got into the eye," are the statements usually made by patients at the commencement of catarrhal ophthalmia, which is commonly considered to be a "cold in the eye." During sleep there is very little secretion from the conjunctiva, so that in the morning after sleep a sensation of "dryness of the eye" is complained of; and the slight discharge that has occurred is so altered in character that, accumulating round the eyelashes, it causes them and the eyelids to "stick together"—a condition which at once suggests the use of astringent lotions. The leading symptoms are thus, *redness* of the conjunctiva, some pain and uneasiness of the eye, an increased *discharge* from the conjunctival membrane and Meibomian follicles, and *sticking together of the eyelashes and eyelids.* Vision is generally more or less impaired, by the flocculi suspended in the tears being diffused over the cornea by the motion of the lids. They render objects cloudy, as if a smoked glass were held before the eye.

Treatment.—The patient ought to remain in a room of uniform temperature, and have the bowels freely moved by a searching purgative, such as *calomel* and *jalap.* Astringents or caustics applied to the conjunctiva usually arrest the inflammation. Local applications to the affected membrane are more useful than general treatment; and this disease is one to which the use of powerful astringents is more particularly applicable. The object of astringents and caustic is to cause destruction of the surface with which they come in contact, and to relieve the loaded blood-vessels by the "serous secretion" they induce. The pain caused by caustics or astringents should not continue longer than from ten to fifteen minutes. Before using either lotion or caustics the discharge should be washed quite away from the lids with warm water, or warm milk and water, after which the margins of the eyelids and "inner corner of the eye" are wiped frequently with a piece of lint dipped into the lotion; and while this is being done the patient ought to be made to open and close the eyelids, so as to allow some of the lotion to get "into the eye." This process is to be repeated from three to ten times daily, for about five minutes each time, according to the amount of the discharge. The same piece of lint is not to be used a second time, but must be at once burned, and a fresh piece used for each application.

Solution of the nitrate of silver in distilled water, in the proportion of four grains to the ounce, is one of the best lotions. A large drop of this solution is to be applied to the membrane once or twice, or three times in the course of the day, by means of a pretty thick camel hair pencil. If the patient recline his head backwards the drop is to be placed in the hollow formed in the internal angle of the eye. The drop will then be diffused over the globe upon the separation and subsequent winking of the lids. After a minute or two a pricking, smarting sensation is felt, which ought to subside in from ten to twenty minutes; after which the feeling of "sand in the eye" is entirely removed and the inflammation abated. The eye continues easy for five or six hours, when another drop must be let into it, and so on till the remedy is found to give less and less pain, and at last is scarcely felt, and the cure is complete.

To prevent the eyelids sticking together in the morning after sleep, *glycerine ointment* is to be applied at bed-time along their margin. It is composed as follows:—Mix one part of *amylum* (starch) with five parts of *pure glycerine*, having previously heated the *glycerine* to 102° Fahr. This ointment is soluble in water, always retains the same consistence, and mixes freely with the moisture on the conjunctiva. It is therefore a useful agent for keeping the edges of the lids moist, and serves also as a vehicle for other astringent remedies, such as *sulphate of copper*, *acetate of lead*, *nitrate of silver*, or *red oxide of mercury*. Two grains of either of these substances, well mixed with one drachm of the *glycerine* ointment, are equal in strength to four grains of the same substances when mixed with one drachm of fat. The *Ung. Hyd. Nitratis Mitior* is also of use in keeping the eyelids from sticking together.

PUSTULAR OPHTHALMIA.

Natural History.—This form of inflammation of the conjunctiva is accompanied by small, round, circumscribed, grey, opaque, and more or less vascular elevations, which finally become pustular, or nodules situated in the conjunctiva, at or near the outer and inner margin of the cornea, and rarely on the palpebral conjunctiva. The lesion is generally associated with scrofula, and hence it is sometimes considered as a form of "*strumous* or *scrofulous ophthalmia.*" It has also been called *herpes* of the conjunctiva, and *phlyctænular ophthalmia.* It is a disease to which children are so liable, that out of one hundred cases of inflammation of the eyes of young subjects, ninety are of this kind. It is very often the first and earliest manifestation of a scrofulous constitution; and, if neglected or mistreated, may become the cause of permanently impaired vision, or even of entire loss of sight. It is most prevalent from the time of weaning till about eight years of age. It is rare in adults, unless they have already suffered in early life. Sometimes one and sometimes both eyes are affected from the first; or the disease may pass from one eye to another; and when both eyes are inflamed at once, one is generally much worse than the other. The so-called "pustules" are really small "*pimples*" at first, varying in size. Round their bases the conjunctival and subconjunctival vessels are congested. Groups of the so-called pustules may sometimes be seen at the margin of the cornea, close to each other, causing a flat, circumscribed, grey-red swelling, abruptly defined by the margin of the cornea, and surrounded by large blood-vessels. The appearance of the pustules is preceded by a burning, stinging pain, vascularity of the conjunctiva, with some mucous and watery discharge, and by intolerance of light, even in cases where scarcely any redness is present. This lesion of the eyes is generally associated with other symptoms of scrofula, such as eruptions, sore ears, swollen upper lip, nasal catarrh, enlarged lymphatic glands, swollen joints, tabes mesenterica, dyspepsia, tumid and hard abdomen, and general debility.

Treatment requires that the general health should be improved by the management of the diet, and by every other hygienic arrangement that the case may suggest. In children, especially, the diet must be regulated and restricted to the most digestible and nutritious forms of food and cooking, with a warm bath every day.

There are certain indications for the use of medicinal tonics, of which the following may be stated:—If the lips and nostrils are red and swollen, with crusts round the nasal orifices, the preparations of *arsenic* with *iron* will be found most useful. If the sclerotic is implicated, as indicated by the swelling and characteristic vascularity, the *bi-chloride of mercury* (corrosive sublimate) ought to be given in doses of *one-sixteenth* of a grain in half an ounce (a table-spoonful) of water twice daily. In young children, the *Hydrag. C. creta*, or a combination of *rhubarb*, *soda*, and *calumba* twice daily will be found useful in cases where mercurial preparations may be objectionable. Such medicinal treatment is required to be continued in the constitutional management of such cases for at least two, three, or four weeks, even after the lesions are subdued.

As to local applications, the *lotio aluminis* (p. 366) is to be used to wash the margins of the lids night and morning, if they are "gummed up," and may be discontinued as soon as this condition has subsided. If the discharge is only watery, the lids may be kept clean with warm water only. If the edges of the eyelids are red or excoriated after washing with the *lotio aluminis*, particles about the size of a hemp seed of *hydrarg. nitratis mitius* may be rubbed upon the lids at bedtime.

If vascularity should persist and continue great, with pain and heat —suggestive of corneal implication—one or two leeches may be applied at bedtime to the corresponding temple of the morbid eye. *Quinine*, to the extent of one grain three times a day, is of great use, using at the same time the following collyrium:—

℞. *Corrosive sublimate*, gr. i.; *Ammonii chloridi*, gr. vi.; *Vin. opii.*, ʒ ii.; *Aquæ distilat. ad.* ℥ viii. To be used tepid, by mixing a table-spoonful of this lotion with an equal quantity of hot water, and used as a fomentation for five minutes—a little being allowed to flow into the eye.

Purulent Ophthalmia.

Natural History.—Inflammation of the conjunctiva characterised by true chemosis, and by great secretion of muco-purulent matter, which, rolling up in flocculi, float among the tears, constitutes purulent ophthalmia; or, becoming purulent in six to twelve hours from the commencement, mixes with and dissolves in the tears (*pyorrhœa*).

The disease is characterised by extreme rapidity of progress—so much so, that patients generally present themselves when a high degree of inflammation has been already reached. Commencing as a common catarrhal ophthalmia, within from six to twelve hours, and rarely exceeding thirty, the inflammatory stage may reach the process of pus formation at some part of the conjunctival surface, even before the patient may be aware that he is affected.

The order in which the symptoms succeed each other is as follows:— Itching first felt in the evening, or a sudden feeling of sand between the lids and the eyeball; sticking together of the eyelids, especially after sleep; inflammation of the conjunctiva, characterised by swelling and rapidly increasing vascularity. The semilunar membrane and *caruncula lachrymalis* are considerably enlarged, and redder than usual. The swelling of the parts is soft, somewhat elastic, and easily made to bleed. The itching indicates suppression of the natural mucous secretion of the conjunctiva of the eyelids, and of the *Meibomian* secretion

—a constant and early effect of inflammation on every mucous surface and secreting organ. The thin acrid secretion from the conjunctiva which follows gives the slipperiness to the internal surface of the eyelids, and the *Meibomian* secretion being now increased above its usual quantity, and altered in quality, concretes among the eyelashes, and causes the eyelids to adhere during sleep. The sensation of sand is due to the dilated state of the conjunctival vessels. After twenty-four hours the discharge is still thin, but viscid, and begins to be opaque. It lodges at the inner angle of the eye, and on everting the lids they are vascular and tumid. Not unfrequently a considerable discharge of blood may take place from the conjunctiva, which may be repeated from time to time with temporary relief to swelling, before the puriform discharge commences. It is rather an oozing of colouring matter from the blood, mixed with discharge, than a real effusion of blood from ruptured vessels.

The discharge may exceed several ounces in the day, continuing without much change for twelve or fourteen days, or even longer, and ultimately, as the swelling subsides, the discharge becomes thin and gleety; and later on "granular lids" remain. The papillæ becoming indurated, form a granular, scabrous, mulberry-like surface, which, constantly rubbing against the cornea, keeps up a chronic inflammation of the investing membrane, which becomes covered with red vessels, and tends to lose its transparency. This is a favourable end to the disease; but in less fortunate cases the eyeball may be disorganised. The cornea may be turbid but entire, of a flesh-like appearance from fungous excrescences, penetrated by one or several ulcerations, through which portions of the *iris* may protrude, or the cornea may be entirely destroyed by suppuration. The internal structures of the eye may also suffer in extremely severe cases, the commencement of which is indicated by deep lancinating pains within the orbit, aggravated during the night, coming on most frequently from ten to twelve o'clock, and declining towards morning. In such cases the cornea may give way. Rupture is indicated by a copious discharge of hot fluid, which sometimes gives temporary relief to pain.

Constitutional symptoms are not as a rule severe; but children seem to suffer much more than adults, especially as the local symptoms grow in severity.

Treatment.—If the disease be seen early, before the ocular conjunctiva has become vascular, or but slightly so, the *alum lotion*, or *nitrate of silver* lotion may effect a cure; but if *chemosis* be present, leeches must be applied round the eye, to the number of six to twenty-four. If in the course of twenty-four hours the symptoms do not abate, but, on the contrary, if pulsative pain commence in the eye, with circum-orbital pain coming on in nocturnal paroxysms, the repetition of the leeching is necessary.

If gonorrhœal pus is known to have come in contact with the conjunctiva, it is safest to touch the entire palpebral conjunctiva with *solid nitrate of silver;* and the same treatment may be adopted at any stage of the ophthalmia, however great may be the swelling of the lids or conjunctiva.

A searching purgative of *jalap* and *calomel* is to be given in all cases, and the patient must remain at rest in a well-ventilated apartment, the eyes being shaded from the light. After the *calomel* and *jalap* have acted, *tartar emetic*, with *sulphate of magnesia*, will be found useful.

PURULENT OPHTHALMIA OF INFANTS—*Syn.*, OPHTHALMIA NEONATORUM.

Natural History.—Purulent ophthalmia of infants appears generally on the third day after birth, generally within a week, but sometimes not for three or four weeks, and with symptoms similar to those in adults. The disease is a very common one; and, if neglected, it may become very serious. It is perhaps the most fertile source of blindness with which we are acquainted. The disease is sudden in its attack. like most contagious diseases, and much more violent than in catarrhal ophthalmia. In this respect it resembles the Egyptian ophthalmia, or the gonorrhœal inflammation of the conjunctiva. It originates most commonly in contagion:—(1.) By inoculation of the conjunctiva from leucorrhœal fluid (generally acid) during parturition; and thus it may be prevented by repeated injections of tepid water, or weak alkaline solution, into the vagina in the first and second stages of labour, and by carefully washing the eyes of the infant with lukewarm water as soon as it is removed from the mother. (2.) In its worst form it may result from contact of the conjunctiva with gonorrhœal matter during the passage of the child's head through the vagina; and the same precautions are to be used as in the already named mode of origin. (3.) It may be induced by exposure to the light, to the heat of the fire, or to a cold draught from the door (catarrhal). (4.) By intrusion into the eyes of the soap with which the child's head is washed, or of the whisky or gin with which the lower classes are wont to bathe the infant's head, from a belief in the strengthening virtues of these spirits.

On the morning of the third day after birth, the infant may be observed to have what the mother and nurse may call a "cold in the eye"—the upper eyelid being somewhat swollen, its edge red, and the eyelashes glued together by concrete purulent matter. The inside of the eyelids, especially the palpebral conjunctiva and fold formed by its reflection to the eyeball, are extremely vascular and swollen; and for some days a thin mucous or serous discharge may flow from them; but always becoming distinctly purulent at a very early period—as early as the third day. Generally both eyes are affected, at a short interval of time between the affection of the one eye and the other. The infant keeps the eyes constantly shut, and this state may continue for eight or ten days without any affection of the transparent parts, except, perhaps, slight haziness of the cornea and redness of its edge. By the twelfth day the cornea may become opalescent, indicative of commencing degeneration; it may be infiltrated with pus, by which its texture is speedily destroyed, when it gives way by ulceration, and generally the lower part of the iris protrudes through the ulcer. In other cases the whole cornea disappears, exposing the *iris*, with the humors bulging through the pupil, and the lens may fall away, or be discharged through the ulcerated cornea.

Treatment.—The eyes must be well washed out three or four times or oftener in the twenty-four hours, by the solution of *alum* or *sal ammoniac* lotion. *Solution* of the *nitrate of silver* is necessary to follow, in varying strength, according to the state of the conjunctiva—from two to ten grains to the ounce of distilled water is to be used every six or eight hours, the solution being applied to the whole surface of the inflamed conjunctiva with a camel-hair brush, as already described. In two or three days the eyes ought to open spontaneously, and in ten or twelve more the acute symptoms may be overcome. A case of moderate severity recovers in from six to eight weeks, and the use of the detergent lotions every two hours, for about three weeks, is sufficient, if the ophthalmia is mild—*i.e.*, if the corneæ are clear and the lids open spontaneously. To prevent the eyelids adhering, *red precipitate ointment*, or the *unguentum hydrargeri nitratis mitius*, or the *glycerine* and *starch ointment*, may be used. The eye not inflamed should be kept bound up. It may be necessary, in severe cases, where the swelling of the lids is such as prevents the corneæ being seen, to use the detergent lotions and nitrate of silver solution every five or ten minutes during the day, and every hour at night, for from three to five days, until a view of the corneæ can be obtained.

Castor oil should be given to improve the condition of the intestinal canal. Blisters behind the ears are also of service in the successful treatment of this disease.

GRANULAR OPHTHALMIA*—*Syn.*, GRANULAR CONJUNCTIVITIS.

Natural History.—It is a frequent and troublesome result of the puro-mucous ophthalmiæ already described, and in this sense may be considered as a form of *chronic ophthalmia*, with multiplication of intra-follicular corpuscles of conjunctival glands, and germinative cell-growth in the surrounding connective tissue, causing hypertrophy of conjunctival villi, roughness from "granulations," hyperæmia, swelling, and inflammation of the conjunctival membrane. The prominences on the conjunctiva (erroneously called "*granulations*"), have generally been believed to be the *villi* or *papillæ* of the palpebral conjunctiva, along with its glandular elements, hypertrophied and altered by chronic inflammation. In the normal state the villi are visible under the microscope, although the conjunctiva is not injected; and in a well injected preparation they are visible to the naked eye. In this disease they form the round granules, sometimes of the same colour as the conjunctiva, and only very slightly prominent. These "*granules*" may be greatly elevated from its surface, and from their shape and gelatinous translucency resemble the spawn of fish or frogs. These primary granulations are situated immediately beneath the epithelium, and represent spherical or ovoid bodies, in which nucleated cells, similar to lymph corpuscles, are enclosed in the meshes of an extremely delicate reticulum of connective tissue. They are either surrounded by a well-defined layer of condensed stroma, interspersed with long fusiform cells, or merge diffusely into the tissues in which they are imbedded.

The symptoms are especially impairment of vision: the patient complains that he "cannot see," that the "sight is misty," that "a mist" and "rainbow colours appear round the flame of a candle," and that after sleep or after exertion the eyes are "red and weak." In some cases the granular prominences are exceedingly numerous, slightly raised above the level of the conjunctiva, giving the inside of the lids an appearance somewhat like that of a piece of *shagreen;* in other cases the granules are comparatively few, but prominent, very soft, vascular, and apt to bleed—often as large as hemp seeds. On inspecting the eye generally, before opening and everting the lids, in nine cases out of ten no departure from the healthy state will be seen beyond an occasional slight collection of dried secretion at the roots of the lashes, and in the severe form a somewhat increased fulness of the larger sclerotic vessels. In these hyperæmic cases the gluing of the lids and the watery eye are causes of discomfort, the inconvenience, with augmented mucus and tears, being generally in proportion to the hyperæmia; but as a rule the eye remains quiescent when the causes of irritation in the lids have been gradually produced.

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* Not mentioned by the College of Physicians.

A powerful reading-glass is necessary in examining lids to see the granules in their earlier or vesicular stages. Several species of granulations may be distinguished by the following characters:—(1.) Little granules, of the size and appearance of soaked sago grains, standing side by side, either in groups or singly, and projecting from the nearly normal or more or less vascular conjunctiva. (2.) Vascular "red" granulations of different sizes—largest in the fornix—with confluent bases resting upon the vascular and hypertrophied conjunctiva, which in severe cases appear infiltrated with a semi-transparent gelatinous-looking substance; but in slighter cases the sub-conjunctival tissue is not much implicated, and the granular surface of the conjunctiva may be thrown into folds. (3.) Large pale-grey, grey-white, or yellowish-grey, and opaque granulations, whose shape, size, and subsequent changes are similar to those of the red ones. They rest upon the infiltrated conjunctiva and sub-conjunctival tissue, and reach their largest size in the fornix, and along the upper margin of the tarsus. (4.) Small, easily bleeding, flabby granulations of equal size, which stand side by side, and give the surface a somewhat rough villous appearance. The conjunctiva covering the tissue is swollen, intensely red, and easily made to bleed. (5.) Large, flabby, red, and rather hard and elastic granulations of varying size, resembling condylomata in shape, with hardly any or no purulent discharge. They occupy the palpebral conjunctiva, and frequently also the semilunar fold. In the fornix they may reach several lines in diameter, and they often continue for years without impairing the transparency of the cornea; but when very numerous, they may prevent the eyelids from closing, and cause them to stand away from the eyeball, and sometimes even to become everted. This form is rare, and occurs by preference in young persons suffering from glandular swellings in other parts.

Numbers (1), (2), and (3) are closely allied; but treatment and time alter their typical appearance; numbers (4) and (5) are wholly different from each other and from the other varieties.

Treatment is by local depletion, by a few leeches, if the conjunctiva is very vascular, astringents, escharotics, counter-irritation, tonics, excision, and inoculation.

The object of treatment by *astringents* and *escharotics* is not to destroy the granulations directly, but to excite such irritation in the conjunctivæ as will promote elimination of the material of which the granulations are composed. The agents most frequently in use are crystals of *borax*, *sulphate of zinc*, *nitrate of silver*, and *sulphate of copper*, or its mixture with *alum*, constituting the "green stone," or *Lapis devinus.* The *neutral acetate* or *sugar of lead*, in the form of a powder, has also been used. It is to be applied over the surface by means of a miniature pencil, and allowed to dissolve in the tears. It causes strong contraction of the diseased tissue; the granular prominences shrink, and the membrane appears smooth and uniform. It is to be applied at intervals of five or six days, till the cure is accomplished. The *sulphate of copper* in glycerine ointment is also likely to be of use. The green stone application is the most efficient remedy, care being taken to touch the granulations only, and not the conjunctiva between them, nor the cicatrices, if any exist. It must be repeated every day, or every second or third day, till the granulations have become smaller and less numerous, when "touching" twice a week may suffice.

SECTION II.—DISEASES OF THE CORNEA.

KERATITIS.

Natural History.—All of the tissues of the cornea are liable to be affected by inflammatory changes, from the parenchymatous or "cloudy swelling" of minute tissue up to the more crude changes obvious to unaided vision. These crude changes are always associated with congestion in the surrounding conjunctiva and sclerotic, especially marked in the anastomosing wreath of blood-vessels close to the edge of the cornea. The exudation visible in the cornea itself affects most frequently its external lamellæ, sometimes its proper substance, and always impairs its transparency. When blood-vessels become developed in the exuded material, the cornea appears red. But many minute changes go on in these delicate and minute tissues before these more obvious events take place, and the disease increasing beyond these obvious events, there may occur such changes as suppuration, ulceration, or gangrene of the corneal textures. In most of the ophthalmiæ already described, the *cornea* may participate to such an extent that it may be infiltrated with pus, or destroyed by ulceration, or its transparency injured by constant irritation (as by granular lids), producing a vascular and nebulous state of its surface. It is also a common seat of the phlectenatæ which attend scrofulous conjunctivitis, and layer after layer may be penetrated by ulceration.

Three varieties of *keratitis* are commonly met with, namely:—

(1.) *Syphilitic keratitis*, which declares itself most frequently between the ages of nine and fifteen—and in girls oftener than in boys—as a result of inherited syphilis, associated with syphilitic indications in other parts. It may be found in such cases that the mother has had miscarriages or still-born children previous to the birth of the one suffering from *keratitis;* and also that the patient has suffered from other symptoms of syphilis during infancy, such as *snuffles*, a sore mouth, ulcers round the *anus*, skin eruptions, and the like.

The physiognomy of such patients is characterised by a generally old, pale-looking face—a squarish forehead, with the bridge of the nose frequently wide and depressed. The shape, size, and colour of the permanent incisor teeth are often also peculiar; being small, narrow, squared, of a yellow colour, and more or less deeply notched in a vertical direction. Syphilitic keratitis generally appears in both eyes, within an interval of a few days or weeks; and may take a chronic course, continuing for several years—at one time being completely opaque or crimson red, and again recovering its transparency after a few weeks; and it is generally on account of impaired sight simply that such patients seek advice. The impaired vision may be due to the following lesions:—Opacities in the cornea; alterations of its curvature; opacities in the crystalline lens; changes following choroido-retinitis; inflammation of the optic nerve; or such cerebral changes as hydrocephalus.

(2.) *Strumous corneitis*, *scrofulous ophthalmia*, or *vascular corneitis*, is associated with the general morbid condition described as scrofula. It occurs most commonly in children from eight to eighteen years of age, and in females shortly before or about the age of puberty. There is generally pain in the affected eye, sometimes severe, and extending over the corresponding side of the head and face. The eyelids are generally red along the margins, slightly swollen, and tending to spasmodic closure, when there is abundant flow of tears and intolerance of light. With these symptoms there are generally one or several small ill-defined opacities in the cornea. Opaque and slightly vascular spots at or near the centre of the cornea, at the commencement of the attack, are seen to advance from the margin towards the centre. These are generally superficial, but in weak persons they may extend through the entire thickness of the cornea. The parts affected appear grey, greyish-white, or yellowish and opaque, shedding off to the transparent parts, or merging into the sclerotic; and the vascularity of the sclerotic and conjunctiva is most marked next the inflamed part. In some cases the whole cornea is so much covered with innumerable blood-vessels that it assumes a red colour, and in this state it has been compared to a piece of red cloth, an appearance known by the name of "*pannus.*" Ulceration with perforation may occur.

(3.) *Pustular corneitis*, *phlectenular*, or *herpetic corneitis*, are forms of the affection generally also associated with *scrofula*, and occurring most frequently in young persons and children. There is extreme intolerance of light, which may continue for months, with slight redness, swelling and spasmodic closure of the eyelids—abundant flow of tears, and frequently eczema of the surrounding skin, although the changes in the cornea may be very slight. These changes consist in the occurrence of one or several roundish, small, somewhat projecting opaque nodules in the superficial layers of the cornea. If multiple, they may exist in groups or in rows near the margin of the cornea. One nodule, or group of nodules, may appear at the apex of a bundle of blood-vessels, diverging over the cornea, thus forming a vascular triangle, ultimately lost in the adjoining conjunctiva.

Treatment of these three varieties must be regulated by the general morbid condition of the system. The constitutional state of ill-health must be repaired, as the first essential step towards recovery. The syphilitic and scrofulous, or combined condition of those morbid states, must be remedied as far as possible by the appropriate medicines and diet already indicated under the description of these diseases.

KERATITIS WITH SUPPURATION—*Syn.*, ONYX.

Natural History.—Inflammation with purulent collection between the lamellæ of the cornea, producing cloudiness, disintegration, and breaking up of the cornea into fatty granular degeneration, are the elements of this disease. The formation of pus in the cornea is usually associated with more or less of ciliary irritation. The pus collection may appear as a layer of yellow substance in the cornea, or reddish if mixed with blood. At first the collection of yellow matter is not fluid, but its transformation into pus usually begins after a few days, generally in the centre of the mass; but often in several points at the same time. Sometimes the pus sinks down between the lamellæ of the cornea, pressing them apart—hence the name of *unguis* or *onyx*, from its resemblance to the *lunula* of the nail. Corneal ulcers are a frequent result of this process. Perforation may also occur into the anterior chamber, giving rise to *hypopion*—that is, to an accumulation of pus or of shreds of lymph at the most depending part of the anterior chamber; or its inward perforation may give rise to iritis. An *onyx* is known by its superior limit being convex, and by its remaining unchanged in form and situation whatever be the position of the patient's head, whereas *hypopion* gravitates to one or other side, according to the direction in which the head is placed. The pus may be removed by absorption in the course of a few days or a few hours; but that is not usually the happy event.

Three varieties of suppurative keratitis are to be distinguished:—(*a.*) Cases in which the suppuration comes on rapidly—*i.e.*, in from one to three days, with great increase of vascularity and pain, with some chemosis, intolerance of light, and lachrymation. This form often follows operations or injuries, especially blows from stones, and may be accompanied by abrasion of the cornea. It may also occur in the course of *purulent ophthalmia* or *pustular corneitis.* (*b.*) Cases in which the suppuration appears slowly, having been preceded by protracted corneitis, as in weak ill-fed persons suffering from syphilis. (*c.*) Cases where there is no intolerance of light, or hardly any, with chemosis, mostly serous, with moderate watery or purulent discharge, and with rapid suppuration. This form may be observed spontaneously, or after operations on very old or decrepit persons, and after severe illness or fevers.

Treatment.—The object is to check suppuration, by warm or cold applications, according to the indications. If suppuration is accompanied by a sensation of great local heat and much pain, the application to the eyelids of lint dipped in cold water is indicated. The constitutional indications must be followed out in accordance with the history of the case.

SECTION III.—DISEASES OF THE SCLEROTIC.

SCLEROTITIS.

Natural History.—The white or hard membrane of the eye, which forms a tough and firm, very slightly expansive fibrous capsule, everywhere closely enveloping the choroid and the ciliary body, and organically connected with them, and named the *sclerotic.* It has a large opening for the passage of the optic nerve, with numerous small apertures for the blood-vessels and nerves of the *choroid.*

Inflammation of the sclerotic is characterised, in the first instance, by proliferation of its connective tissue corpuscles. In acute and severe cases its texture may become cloudy by a molecular deposit, or by an extensive separation (by degeneration) of granular fat, or infiltration of serous fluid, any or all of which conditions impair its cohesion.

Inflammation of the sclerotic is generally referable to the following circumstances:—(a.) *Syphilis;* (b.) *rheumatism;* (c.) *the extension of the inflammatory process from other structures, such as the conjunctiva or ciliary processes.*

In the syphilitic form the inflammation is generally circumscribed and associated with inflammation of the conjunctiva and subconjunctival tissue. It generally commences in the ciliary region, where it forms patches of a purple tint, covered with enlarged vessels. The textures appear swollen; and in from five to ten weeks the inflammation may subside, leaving the sclerotic slightly discoloured, semitransparent, and thinner. Such circumscribed inflammations often appear successively in adjoining parts of the ciliary region of the sclerotic.

Rheumatic sclerotitis, where the sclerotic is alone affected, is a rare disease. Generally the *conjunctiva* and *sclerotic* are each affected at the same time, or the *sclerotic* is directly affected after the *conjunctiva*, and both eyes are seldom affected at once.

The vascular appearances of sclerotitis are characteristic. Fasciculi of vessels of a bright red colour advance in radii toward the edge, and sometimes a little over the edge of the cornea, surrounding it pretty equally on all sides. They appear larger and more turgid than in iritis, and seem to rise more from the surface of the *sclerotic. Conjunctivitis* is less expressed, and is never sufficient to mark the radiated inflammation of the sclerotic.

Dimness of vision is constant, depending on haziness of the cornea, attended by slight contraction of the pupil and sluggishness in the movements of the iris. The pupil is seen to be less than that of the sound eye. The iris becomes slightly discoloured; if naturally blue, it tends to green, and the attending *iritis* may proceed even to effusion of coagulable lymph within the pupil; but the degree of iritis in rheumatic sclerotitis is rarely severe.

The affected eye feels dry and hot in the early period of the disease. and there may be considerable *epiphera* afterwards. The pain of *rheumatic sclerotitis* is characteristic. It is of a stinging kind, extending from the eyeball to the orbit and neighbouring parts of the head. The temperature of the eye is increased, and the pain is augmented by warmth and relieved by perspiration. Pain may also affect the forehead, the cheek-bone, and the teeth, extending sometimes even to the lower jaw, the side of the nose, within its cavities, or the ear. It may be precisely confined to one-half the head. The superciliary ridge is its chief seat, next to that the temple and the cheek. When felt chiefly in the eyeball, it has the pulsatile character of phlegmon; otherwise it is particularly expressed round the orbit, consisting rather in an agonising kind of feeling, which distresses and wearies out the patient. Evening exacerbations are constant from four, five, six, or eight P.M., and continuing during the night, become most severe about midnight, and do not abate till about five or six A.M.

Treatment.—A searching purgative should commence the treatment. Circumscribed inflammation, associated with syphilis, generally yields to *bichloride of mercury* ($\frac{1}{24}$ to $\frac{1}{16}$ of a grain, twice daily in water), combined with the local application of *atropia*. In rheumatic sclerotitis, bleeding, both general and local, has been advocated in young and plethoric patients. The night after general blood-letting (to the extent of fifteen to twenty ounces) a dozen leeches round the eye may be applied with relief to the supra-orbital pain. A pill, composed of four grains of *calomel* with one grain of *opium*, is to be given every evening till the gums are tender, when calomel may be omitted, and ten grains of *Dover's powder* substituted for opium. *Ptyalism* must not be induced.

The hypodermic injection of *morphia* relieves nocturnal pains; and *chloroform liniment*, with *belladonna*, may be applied to the skin of the forehead and temple. A large blister to the nape of the neck is also of service. *Quinine* and *Fowler's solution of arsenic* are useful tonics during convalescence.

During the whole course of *rheumatic sclerotitis* the pupil of the affected eye ought to be kept under the constant influence of *belladonna*.

SECTION IV.—DISEASES OF THE IRIS.

IRITIS.

Natural History.—The iris is a diaphragm or thin curtain, having a circular opening near its centre, called the pupil, which is capable of being enlarged or contracted by muscular action.

This diaphragm or curtain is frequently the seat of inflammation; and small as the iris is, the inflammation is often seen to be entirely confined to it, or to its surfaces anteriorly and posteriorly. *Iritis* may thus exist as independently of inflammation in other membranes of the eye, as *conjunctivitis*, *sclerotitis*, or *corneitis*. With *iritis* there is always, at the same time, some inflammation of the *choroid*, *retina*, anterior hemisphere of the *capsule*, the *sclerotic*, and *conjunctiva*. But the iris is the focus or starting point of the inflammation, and the seat of the most striking morbid changes. It is at the pupilary or free margin that inflammation generally appears to commence, whence it spreads to the rest of the *iris*, to the *capsule of the lens*, to the *choroid*, and the *retina*. The accompanying *sclerotic* and *conjunctival* inflammations are believed to be sympathetic or reflex. The normal condition of those deeper parts of the eye can now be seen by means of the ophthalmoscope; but there is also this proof to shew that the iris is often the only part which permanently suffers—namely, that when the natural pupil is closed up by the lymph of iritis, vision may still be restored by an artificial pupil—thus shewing that the choroid and retina have not been impaired. Hitherto the parts concerned in the diseases of the eye that have been described have been of the nature of *mucous* surfaces; but the iris is suspended in an aqueous chamber, which is really a *serous* cavity, lined by a smooth membrane, the source of the aqueous serum which the cavity contains. The pathology of this serous membrane is similar to that of serous membranes in other cavities of the body; but, as Sir Thomas Watson observes, "it is the only *serous* cavity into which we have the privilege of looking, and of noting what is going on, when the membrane that forms its boundary is inflamed." Hence iritis is one of the most interesting, and perhaps also one of the most instructive, of all diseases in the lessons of pathology and of therapeutics, which may be taught by carefully watching the progress of a case from day to day.

There are certain combinations of symptoms characteristic of iritis, from whatever cause it proceeds. These are—a peculiar vascularity; a change in colour and general appearance of the iris; irregularity and immobility of the pupil; a visible and varying amount of lymph in, upon, and round the iris. These are the *objective* signs of *iritis*, and in detail they are—(1.) Zonular sclerotitis, denoted by the fine hair-like vessels running in radii towards the edge of the cornea, so that the cornea becomes surrounded by a zone of fine, straight, converging pink lines. This extremely fine vascular network in the anterior episcleral zone is one of the most constant signs of iritis—the first premonition of inflammation—which continues as long as the inflammation of the iris continues, and disappears when that ceases. The infected tissue is at the same time generally infiltrated with serum; and the conjunctiva participating, a *vascular ring* may form round the cornea. These hair-like converging lines stop abruptly at the edge, or just before they reach the edge of the cornea, where they dip through the sclerotic to reach the iris. (2.) Peculiar discoloration of the iris, which has a dull, glistening appearance. Its peculiar brilliancy of surface is spoiled, and its colour, if naturally blue or grey, becomes of a dirty slate colour, or yellowish green; if of dark colour, it changes to a cinnamon colour, or brownish red. The inflamed eye must be compared with that which is sound. (3.) Great sluggishness or complete immobility of the pupil. In order to test the re-action of the iris, the patient should be so placed that moderately-strong ordinary daylight falls obliquely, from one side only, upon the eye. The unaffected eye should then be closed, not only with the hand, but also with a folded cloth, so that every trace of light be absolutely excluded from it. The examiner then places himself in such a position before the patient that, while he throws a very dark shadow on the uncovered eye with his hand, he keeps the pupil in sight; and, fixing his eye on the edge of the pupil, by removal of the hand, a bright light is thrown upon the eye, and then the eye is again shaded; and so on. One or two changes of light and shade will, as a rule, enable us to conclude as to the re-action of the iris; and the slightest puckering of the pupilary margin will be detected. (4.) Contraction and irregularity of the pupil, caused by increase in its thickness and enlargement of the width of the iris. (5.) A varying amount of "plastic" material in, upon, and round the iris, so that effusion of coagulable lymph into the pupil and posterior chamber is seen, and occasionally into the anterior. (6.) Adhesions of the iris, especially of its pupilary margin to the capsule of the lens, and, in some rare cases, to the cornea. (7.) Impairment of vision is often the sole symptom for which advice is sought. It may arise from opacity of the lens or its capsule; dimness of sight, from changes in the aqueous humour; loss of power of accommodation, and inability to contract the pupil; and from changes in the iris and ciliary muscle. The impairment varies in degree—sometimes only a slight "mist" may appear to intervene between the object and the eye; and the cornea may be dim, like roughened glass, disturbing its transparency. (8.) Pain in the eye, the most inconstant symptom of all, is yet often absent, or so slight that it scarcely excites the attention of the patient. In other cases it appears early, gradually increases, and finally becomes very severe. (9.) The constitutional symptoms are alike uncertain. Sometimes there is a good deal of fever and headache, with white tongue and broken sleep.

Treatment.—In every case, and at any stage of iritis, dilatation of the pupil must be brought about and maintained by the use of *mydriatics*, or agents which enlarge the pupil, chief of which is *belladonna* and its alkaloid, *atropia*, so as to prevent irregularity of the pupil and adhesions, anteriorly or posteriorly (*synechiæ*); to secure rest by preventing contraction of the iris and ciliary muscle; and to alter the tension of the eye, and influence the circulation in the *choroid*. In slight cases, *atropia* should be applied from three to ten times daily; and (if there is severe pain) every five minutes for some hours in the evening; and these frequent applications are to be continued for from two to five days, or till pain and vascularity have lessened, the patient being kept in a darkened room. After all vascularity has subsided, the *atropia* must still be used at least twice daily, and so continued for from two to three weeks, with the view of providing against any relapse. A few drops of a solution of from one grain of *sulphate of atropia* to the ounce of *distilled water*, dropped into the eye, is the most efficient mydriatic. It is most convenient to prepare a solution of two to three grains of *sulphate of atropia* to half an ounce of *distilled water*, and, everting the lower lid, to drop it into the conjunctival sac by means of an obliquely cut quill or a camel's hair brush. The use of *atropia* cannot be entrusted to the patient; and, if symptoms of *belladonna* poisoning should supervene, it must either be discontinued or used in a less strong solution. The pupil may continue to act sluggishly long after the use of *atropia* has been discontinued—a condition which may be remedied by the use of *myopics*, or agents which contract the pupil, such as *Calabar bean*, the alcoholic extract of which, diluted with *glycerine*, in the proportion of one of extract to thirty or fifty parts of *glycerine*, and applied with a camel's hair pencil, is usually employed. One may see the good effects of thus artificially dilating the pupil. On carefully examining an eye where strings of adhesion are visible, connecting the edge of the iris with the capsule of the lens, these adhesions may be *seen* to stretch, and then to break under the dilating influence of *atropia*. The indications for treatment are—(1.) To subdue the conjunctival inflammation; (2.) to prevent or limit the formation of inflammatory material (lymph, pus, or serum), or to promote their absorption; (3.) to preserve the integrity of the pupil, and to dilate it as soon as possible, believing that a fixedly *dilated* pupil is better than one contracted and fixed; (4.) to relieve pain.

Of the remedies to accomplish those ends, the chief are *blood-letting*, *mercury*, and *belladonna;* and of these Sir Thomas Watson's experience leads him to say that, "If I were restricted to the use of one of these means, I should choose *mercury;* if to two, *mercury* and *belladonna;* but the combined employment of the three has the most powerful effect in curing the disease." (Lect. xix.)

RHEUMATIC IRITIS.

Natural History.—Inflammation of the iris occurring in persons of rheumatic habit, although they may not have suffered from rheumatism in any other part of the body, is liable to return again and again. and to be combined with catarrho-rheumatic ophthalmia, affecting especially the sclerotic.

The constitutional symptoms are generally those associated with rheumatism, and there is especially thirst, whiteness of tongue, and quickened pulse, confined bowels, and a disposition to nausea.

Treatment.—Moderate topical bleedings, counter-irritation, and measures conducive to improve the general health, seem to answer best in *rheumatic iritis*. *Colchicum*, *bark*, *sarsaparilla*, *iodide of potassium*, are remedies indicated by the *rheumatic* condition, but are not alone always to be depended upon. The most marked abatement of the local symptoms takes place as soon as the gums are made tender by the use of *mercury*. Two grains of *calomel*, with one-third of a grain of *opium*, is to be given, in acute cases, every six hours; and less frequently in chronic cases, taking care not to induce *ptyalism*. Exposure to cold must be specially guarded against, even in passing from one room to another. Confinement within doors is necessary; and, if the case is severe, confinement to bed. The patient must relinquish animal food and fermented liquors; and his disordered digestive organs must be set right. Powerful opiates are required at night, by inunction of *mercurial ointment* or *oleate of mercury*, with *opium* or *morphia*, or fomentation with hot cloths, over which *laudanum* is sprinkled, or by hypodermic injection of *morphia*.

The bowels must be kept moderately opened every morning. Small doses of *nitre* and *cream of tartar* are useful as a diuretic every two hours. *Atropia* must be freely used; but it will not have any apparent effect till the inflammation is subdued. When the gums become touched by mercurial remedies, the pupil may be seen suddenly to expand in favourable cases.

ARTHRITIC IRITIS.

Natural History.—Inflammation of the iris may occur in persons of gouty habit, in asthenic states of the system, after repeated attacks of gout have produced depression of body and mind, with dyspepsia, flatulence, languor, and irregularity in the excretions.

The subjects of this form of iritis are generally above *fifty* years of age, of sallow complexion—in many instances, but not always so, tobacco smokers and whisky drinkers, who have often suffered from gouty affection, much headache, bad gums and teeth, acidity, flatulence, and lowness of spirits. The textures of the iris in such cases is already presumed to be defective in its sanguineous nutrition, the general health having been impaired and broken by intemperate habits. The *iritis* thus occurs in texture already degenerated, and most unfavourable for cure. The subjects of the disease generally suffer from a plethoric state of the abdominal viscera, the immediate result of deteriorated digestion, dependent on stimulants for appetite and disposal of aliment. The general objective symptoms are similiar to those already described.

Treatment is best commenced by the action of such searching purgatives as *calomel*, in a five-grain dose, combined with one *drachm of compound jalap powder.* The disordered digestive secretions must be set right by such remedies as five grains of *Plummer's pills* three or four times a week, followed by a glass of *Pullna water*, or an aperient mixture of *salts* and *senna*, or *Carlsbad salts* the following morning. This treatment ought to be continued for several weeks, along with other suitable remedies, so as to change the vitiated habits of the digestive organs. *Alkaline* remedies are very useful; and subsequently preparations of *iron*, especially the *carbonate*, and *Fowler's solution of arsenic*, after regulation of the bowels.

GONORRHŒAL IRITIS.

Natural History.—Inflammation of the iris, preceded by gonorrhœa, and sometimes with effusion into the joints, accompanied by excessive pain, intolerance of light, with profuse flow of tears and dusky sclerotic redness. (See under Gonorrhœal Rheumatics, page 171.)

Treatment is by repeated applications of *leeches* round the eye; *calomel* and *opium*, in frequently repeated doses, so as to affect the system short of *ptyalism*, as rapidly as possible; and the continuous use of *belladonna.* The bowels should be acted on with searching purgatives at the same time.

SECTION V.—DISEASES OF THE CHOROID AND RETINA.

CHOROIDITIS.

Natural History.—Inflammation of the choroid is generally only part of an inflammatory process extending over the greater portion or the whole of the eye.

Choroiditis can only with certainty be recognised by the ophthalmoscope. The changes in the eye to be thus recognised are—(1.) *Hyperæmia;* (2.) *inflammatory exudation;* (3.) *atrophy;* (4.) changes in the *retina*, *optic disc*, and *vitreous humor.*

Ophthalmoscopic Appearances.—The inner surface of the sclerotic reflects the light through the choroid and retina, like the silvering to the glass of a mirror; and the greater the quantity of light thus reflected, the better will the details of the choroid be recognised. The more pigment the less light. The pupil should be well dilated with *atropia*, when the whole of the choroid, from the *optic disc* to near the *ora serrata*, can be seen, and in *albinos* the tips of the ciliary processes. The points to attend to are—(1.) *The choroidal aperture—i.e.*, to the part of the *choroid surrounding the optic disc.* (2.) *The region of the yellow spot*, which is readily seen by directing the patient to look direct at the sight hole of the ophthalmoscope. (3.) *To the equatorial region of the eye*, which is best explored by looking slantingly into the eye. The *individual* capillaries composing the choroid membrane cannot be seen in the healthy eye, being not more than the $\frac{1}{1400}$ part of an inch in diameter; but when filled with blood give the characteristic pale or brilliant red colour, one of the most characteristic features of the interior of the fundus of the eye. The colour of the iris may suggest the tint of the choroid,—a *blue iris* being generally associated with a brilliant red choroid, and a *black iris* with a choroid of almost neutral tint. The brilliancy of the general red hue depends upon the quantity and degree of tinting of the pigment and amount of blood circulating in the choroid. Groups of hexagonal cells may be seen as small dots in all eyes in the equatorial region of the eyeball; and in fair eyes, especially of children, on most parts of the choroid. The particular tint of the fundus of the eye thus mainly depends on the relative proportions of blood and pigment present in the *choroid.* A small amount of pigment with a natural fulness of choroidal vessels gives the fundus a bright, clear, red colour, slightly tinged with orange, the larger choroidal vessels being distinctly visible; a little more choroidal pigment imparts a more decided orange or brownish red. The sclerotic in the eyes of young persons may take an active part in the inflammation.

The following are the forms of *choroiditis* which are to be distinguished:—(1.) *Simple* or *plastic;* (2.) *Suppurative;* (3.) *Syphilitic;* (4.) *Serous;* (5.) *Traumatic*, *sympathetic*, or *reflex.*

The general symptoms consist mainly of the sudden occurrence of severe throbbing and darting pains in the eyeball and corresponding half of the head, occurring in paroxysms, and much increased during the night. The eye feels stiff, with a sense of fulness and distension, and so excessively tender that the patient cannot touch it or allow it to be touched. Frequent flashes of vivid, reddish, or orange-coloured light are seen, even in the dark, or a luminous spot in the axis of vision, increased by everything which quickens the circulation. The eye is suffused with tears, and highly intolerant of exposure. An attack of acute choroiditis may come on suddenly in the night, and in the course of a few hours totally abolish the sensibility of the retina. In such a case vision is rarely recovered, although redness and pain may be subdued. In other cases, vision becomes dull and misty, and the mistiness rapidly increasing, the eye in a few days becomes completely blind (*amaurosis*).

Considerable constitutional disturbance, expressed in the form of restlessness, sleeplessness, flushing of the face, giddiness, and nausea may co-exist. The tongue is generally foul, the mouth parched, and there is much thirst. The pulse is quick and hard; and so great has been the pain and long continued the want of sleep, that such constitutional disturbance has been known to lead to a fatal termination. The subjects of choroiditis are generally past middle life, and more often females than males.

Glaucoma is a term formerly applied only to the last stage of *choroiditis*, when the pupil had become fixed, irregular, and dilated, its area greenish, the ciliary vessels enlarged, and the eyeball of stony hardness, and vision lost. Now the term is applied to a series of lesions far short of these results, and which may be going on in persons apparently with perfect sight. It now implies a series of morbid changes in the eyeball, the most prominent of which (and one which seems to be the basis of all the others) is an increase in the tension of the eyeball, attributable to an increased amount of the contents of the *vitreous chamber*, and to changes in its contents, giving rise to disturbances in the circulation, nutrition, and functions of all the textures of the eyeball.

Sudden and paroxysmal attacks of chronic inflammation (choroidal at first, but implicating all the connections of that membrane) are characteristic of the conditions which bring about *glaucoma*. These attacks are generally sudden, with remissions; or chronic, with exacerbations, and with few distinct external evidences. Objectively, in such cases, the disease is recognised by excavation of the papilla of the *optic nerve*, by varying degrees of hardness of the globe, and evidences of local congestion.

Symptoms of disturbed tension of the eyeball ought now to be accepted as evidence of *serous choroiditis*, if not of general involvement of the membranes of the eyeball in grave, though chronic inflammatory changes. This increased hardness of the globe has long been recognised as the fundamental feature of the glaucomatous condition; and thus the student must be practically familiar with the normal tension of the eyeball. It means the resistance which we feel, or the depression which we see, when the eyeball is pressed upon in its equatorial region. In healthy eyes it varies but slightly. The highest degree of increased tension exists when the eyeball can no longer be "dimpled" by pressure with the fingers. To ascertain the tension—

(*a.*) By touch :—The eyelids are first to be closed gently, then rest one forefinger upon that spot of skin which corresponds to the *outer margin* of the *superior rectus muscle*, near its sclerotic insertion, and place the other forefinger upon a corresponding spot near its *inner margin.* By gently pressing upon the skin and eyeball with one forefinger (as when examining for fluctuation) the tunics of the eye are felt to yield more or less readily to the pressure, while the spot upon which the other forefinger rests is somewhat raised.

(*b.*) By sight:—Direct the patient to look upwards, and gently press the inner edge of the margin of the lower lid upon the sclerotic. By such pressure the curvature of the sclerotic and that of the other tunics become altered, being pressed towards the elastic contents of the vitreous chamber. The amount of flattening or indentation indicates the degree of tension. If the tension is extreme, the entire eyeball will be displaced, no visible indentation being produced.

Treatment of choroiditis is similar to that of the corresponding forms of iritis; but when atrophic spots appear, no treatment can repair the damage. *Mercury* cannot be borne to the same extent as in iritis. *Opiates* are necessary, externally and internally, to overcome pain. The secretions of the intestines, liver, skin, and kidneys, require to be regulated.

RETINITIS.

Natural History.—Inflammation of the retina always starts from the connective tissue framework of the membrane, diffused or circumscribed, with mistiness or darkening of the visual field, cloudiness, with or without hæmorrhagic extravasations, and great local congestion.

The following are the principal forms of *retinitis*:—

(1.) In *diffuse retinitis* there is regular or ill-defined cloudy opacity of the *retina* and *optic disc*, with obliteration of the posterior choroidal boundary; congestion of the larger vessels; inclination to hæmorrhage, and mistiness or darkening of the field of vision, which, increasing, usually calls the patient's attention to his condition. A fog seems to envelop everything. Sharpness of central definition is decreased with indistinctness of eccentric vision. This diffuse form often depends on constitutional syphilis, which is solely indicated by the symptoms and history of syphilis, having no other special peculiarities to distinguish it. (2.) *Exudative retinitis* is characterised by light-coloured spots, bordered by dark pigment appearing in the fundus of the eye, during or after diffused or circumscribed inflammatory retinal cloudiness; destruction of the pigment and atrophy of the choroid tissue exists.

Externally, the eye may seem perfectly normal; but there may be cloudiness of the vitreous humor, rendering ophthalmoscopic examination difficult. There is also mistiness and darkening of the visual field, corresponding in position to the points of exudation, described as thick, white or grey, or bluish mists, or as dark, snake-coloured, or black spots, or irregular interrupted rings, lying over limited parts of the field of vision. Existing alone, without being diffuse, exudative retinitis appears to be most frequently associated with constitutional syphilis. (3.) *Nephritic retinitis* is characterised by collections of a cloudy substance in the posterior half of the retina, forming a patch-like prominence around the *optic disc.* The exudation is accompanied by numerous hæmorrhagic extravasations, great local congestions, and decrease of vision, which gradually sets in, occasionally interrupted by temporary arrests or improvements, and characterised by a generally irregular cloudiness or darkening of the field of vision, with or without peripheral limitation. It occurs only in connection with Bright's disease of the kidney; appearing even in the early stage of albuminous nephritis; but more usually in the later stages of chronic cases. The morbid conditions of the kidneys have generally been fatty, lardaceous, or granular, contracted and atrophied, associated with this form of *retinitis.* It may appear whenever albumen is present in the urine, or the retinitis may even be the first prominent symptom of kidney disease.

Treatment cannot be given in detail, as the general hygienic and medical management must be directed towards the cause of the retinitis, and improving the general health of the patient, as indicated by the pathology of the special case.

AMAUROSIS.

Natural History.—This affection is characterised by certain organic changes in the optic nerve and retina, or other parts of the nervous system essential to vision, causing an inability to perceive objects which lie in certain portions of the visual field, with a distinctness corresponding to the amount of illumination and size of the visual angle. In bad cases the objects cannot be seen at all, when the condition is known as AMBLYOPIA; and when light cannot be distinguished from darkness it is known as AMAUROSIS.

The conditions under which amaurosis has been brought about may best indicate its pathology. These may be summed up under the following heads:—(1.) Mechanical injuries, solution of continuity or sudden contractions of the space of the *optic nerve* or *retina.* Hæmorrhagic extravasations are found which notably break up the nerve-elements, causing them permanently to lose their conductive power. If they are only pressed upon, and no inflammation follow, with progressive absorption of the extravasation, a partial or complete restoration of vision may follow. These extravasations are not unfrequent in the *retina* as a result of hypertrophy of the left cardiac ventricle, coughing, or lifting heavy weights. Extravasation causing amaurosis has also been found in the *optic chiasma.* Double amaurosis may result from apoplectic extravasation in the *thalamus.* (2.) Sudden interruption to blood supply, as by *embolus*, with sudden and marked contraction of some or all the branches of the *arteria centralis retinæ.* Such a form of amaurosis is oftenest seen in anæmic conditions, as in the later stages of *diabetes*, *albuminuria*, *syphilis*, *lead poisoning*, *uterine hæmorrhages*, *hæmatemesis;* and the blindness is generally in both eyes. (3.) The influence of material which poisons the blood and acts upon the brain, or affects the *optic nerve* and *retina*, as atropia, acts on the *ciliary nerves.* The most marked cases of this kind are from *uræmia* and *lead poisoning; opium*, *Calabar bean*, *nux vomica*, and *tobacco.* The extreme use of *quinine* and abuse of *alcohol* have also been known to produce amaurosis. (4.) Congestion and hyperæmia of the eye. (5.) Intracranial changes of tissue (*cerebral* or *central* amaurosis). In such cases the impairment of vision is generally due to lesion of the optic nerve at the base of the brain, such as grey atrophy; which may not affect any part of the cranial cavity. *Basilar meningitis*, or periostitic affections of the basilar bones affecting the optic nerves, may induce *hemiopia* of the same side in both eyes, or total blindness of one or both eyes. Tumors at the base of the brain, involving the nerve directly or by pressure, in or by the morbid growth, are also intracranial causes of amaurosis. They are usually found at the base, especially about the *sella turcica* and neighbourhood of cerebellum. Actual disease of the brain itself may also be a cause, such as *encephalitis*, *abscess*, *softening*, *tubercle*, *gummy tumors*, *hydatids*, *hæmorrhages;* but their relations to amaurosis are very complicated. Generally they cause amaurosis through exciting *meningitis*, which, spreading rapidly, extends to the intracranial portion of the *optic nerve*, or influences the *optic cavities.*

Thus the causes may be either ocular in the *retina*, *choroid*, or *optic nerve;* or *extra-ocular*, but *orbital;* or *cerebral*, or *spinal.*

The *symptoms* vary greatly in each individual case and stage of its course. Impairment of vision is the most prominent symptom, which may be irregularly distributed upon the various parts of the visual field. The field of vision must therefore be carefully and repeatedly examined in all cases of amaurosis; and a record kept from time to time, in order to gain a clear idea as to the amount of impairment of function, and as to the progress of the case. The following points must be especially determined:—(*a.*) Size and form of the whole field of vision; (*b.*) central acuteness of vision and definition; (*c.*) manner in which distinctness of perception diminishes in each sector of the field of vision towards the periphery.

Treatment must vary in accordance with the ascertained cause; and hence the student must learn the nature of the several diseases and their management, which are associated with amaurosis.

CHAPTER XII.

DISEASES OF THE CIRCULATORY AND RESPIRATORY ORGANS.

SECTION I.—METHOD OF STUDYING THESE DISEASES.

THE recognition of the individual diseases of the heart, lungs, great blood-vessels, and vascular glands—of the contents and parietes of the thorax generally, are so intimately related to each other, that some preliminary instructions as to the methods of studying them are necessary. These diseases are especially recognised by certain *symptoms—local* and *constitutional*, *peripheral* and *central*—as well as by certain so-called *physical signs.* To appreciate the departures in these respects from the normal or healthy standard, students are recommended to practise on healthy persons all the modes of investigation to be hereinafter described. One ready means of doing so is to meet together and examine each other. Much time and labour must be devoted to such practice, alike on persons in health and in disease.

In all such examinations as to the soundness or unsoundness of organs and parts within the chest, its surface must be fully exposed before and behind. Neither auscultation nor percussion can be satisfactorily performed through clothing of any kind, except it be of the thinnest possible texture, which females may be permitted to wear. In them immediate auscultation is indelicate; in dirty persons it is disagreeable; while in the contagious diseases it is not without risk; and there are some situations in which the ear cannot be applied, and others in which the stethoscope is more convenient. It may be necessary, therefore, in some cases, to interpose the thinnest possible cotton covering for the sake of cleanliness. The physician and the person being examined should be placed in positions of least restraint for both.

The examiner ought not to stoop, nor be obliged to bend his head too much. The person being examined may stand upright, with the arms hanging by the sides, when the front aspect of the chest is explored; sitting on a chair or stool, stooping forward, with arms folded in front of the chest, is the best position for exploration of the back; and when the sides of the chest are explored, the best attitude is erect, with the arms alternately crossed over the head, or behind the head, or in front of the forehead, so as fully to expose the cavities of the axilla, and by extension of the *latissimus dorsi muscles* the lateral posterior region will be covered with the least possible amount of muscle.

While every part of the chest must be thoroughly examined, the region of the apices of the lungs, before and behind; the region of the base of the lungs, especially behind and laterally; the region of the heart, of its apex, its base, and its valves, and the course of its great vessels, are the parts requiring especial attention. (See also on "Case-taking," Part I., p. 14.)

SECTION II.—GUIDE TO THE CLINICAL INVESTIGATION AND DIAGNOSIS OF DISEASES OF THORACIC VISCERA.

1. Regions of the Thorax and their Contents.—A complete inspection should take in simultaneously the abdomen as well as the chest, and the regional topography of these parts ought to be studied together.*

Prominent points of the skeleton are here made the basis of the system by which the regions are mapped out by vertical and horizontal lines. The vertical lines having relation to the chest are *eight* in number, and run as follows:—(1.) Along the middle of the sternum, from its upper to its lower end; (2. and 3.) from the acromial end of the clavicle to the external tubercle of the pubes (right and left); (4.) along the spinous processes of the cervical and dorsal vertebræ; (5. and 6.) along the posterior or spinal border of the scapulæ (right and left); (7. and 8.) from the clavicular transverse line to the mammary transverse line (right and left).

The horizontal or transverse lines are four in number—(1.) Around the lower part of the neck, sloping downwards to the upper end of the sternum anteriorly, and to the last cervical vertebra posteriorly; (2.)

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* Blank outlines of the trunk of the body—before, behind, and laterally—on which the student may indicate the areas or limits of physical signs in the clinical exploration of diseases, have been prepared by the Author, and are to be had of the publishers, Charles Griffin & Co., 10 Stationers' Hall Court, London, E.C.

around the upper part of the chest in the line of the clavicles; (3.) around the middle of the chest by the lower edge of the *third* rib, above the line of the male nipple, and touching the inferior border of the scapulæ behind; (4.) around the lower part of the chest, on a level with the xyphoid cartilage.

By these lines the lower part of the neck and the chest are divided into three horizontal and eight vertical bands; and by the intersections of these lines various compartments or regions may be indicated as follows:—

Anterior, *lateral*, and *posterior* regions being recognised, the *anterior* are named the *supra-clavicular*, *clavicular*, *infra-clavicular*, *mammary*, *infra-mammary*, *supra-sternal*, *superior sternal*, and *inferior sternal*. The *lateral regions* are—the *axillary* and the *infra-axillary*. The *posterior regions* are—the *supra-spinous region*, the *infra-spinous region* (sometimes called the scapular), the *inter-scapular*, the *infra-scapular* (sometimes called the upper dorsal). Of these regions the three sternal are single; all the rest are double.

The Supra-Clavicular Region is a small triangular space *above* the clavicle on either side, with its base internally at the trachea, its apex towards the outer end of the clavicle, and bounded below by the upper edge of that bone. A line drawn from the outer part of the clavicle to the upper rings of the trachea will limit its upper border. Its floor internally is formed by the upper surface of the first rib. Its *contents* are—the triangular apex of the lung, sometimes reaching on the right side a little higher than on the left, with portions of the subclavian and carotid arteries, and of the subclavian and jugular veins.

The Clavicular Region is very narrow and oblong, corresponding to the inner two-thirds of the collar-bone. *Contents of this region.*—Behind the bone lies lung-substance; but on the right side, at the sterno-clavicular articulation, is the *innominate artery*, and the subclavian artery crosses the region at its outer edge; on the left side the carotid and subclavian arteries pass upwards, almost at right angles to the bone.

The Infra-Clavicular Regions are nearly square. Each region (right and left) is bounded above by the inferior border of the clavicle, below by the lower border of the third rib, where it joins the cartilages of the sternum; it is bounded on the outside by the vertical line passing from the acromial end of the clavicle downwards towards the external tubercle of the pubes (on either side); on the inner side the subclavian region is bounded by the edge of the sternum. The *contents of this region* are—the upper lobe of the lung on both sides, close to the sternal border. On the right side lie the *superior vena cava* and a portion of the arch of the aorta. On the left side, close to the sternum, is the edge of the pulmonary artery. The inferior border of the region on the left side corresponds to a portion of the base of the heart; while part of the right auricle occupies the inferior corner of the region towards the sternum on the right side.

The Mammary Region has also a square-like form, and is bounded above by the line passing through the lower border of the *third* rib, where it joins the cartilages of the sternum below, by the line passing transversely on a level with the xyphoid cartilage (its upper border); outside by the vertical line passing to the outer tubercle of the pubes (on either side); and on the inner aspect by the edge of the sternum. *Contents of these regions* differ greatly on the two sides. *On the right side* throughout the lung lies immediately underneath the ribs. Its inferior border turns off almost at right angles from the sternum, at the cartilage of the sixth rib, whence its thin, sharp border gently slopes outwards and downwards, so as to occupy the lower part of the region when the diaphragm is depressed. But when the diaphragm is elevated, the liver rises into this region up to the fourth interspace. The fissure between the upper and middle lobes of the right lung passes upwards and backwards obliquely across the region from about the *fourth* cartilage. The fissure between the middle and lower portion passes in the same direction from the *fifth* interspace. A portion of the right auricle, also a portion of the right and superior angle of the right ventricle, lie between the *third* and *fifth* ribs, close to the sternum, in the right mammary region. *On the left side*, at about the level of the *fourth* cartilage, the anterior edge of the left lung passes obliquely downwards, having abruptly left the edge of its fellow on the opposite side, so as to expose a free space of variable size for the heart. The edge of the left lung thus reaches the *fifth* rib; whence it comes inwards and downwards to opposite the *sixth* rib or interspace, whence it finally passes nearly horizontally outwards and downwards into the lateral region. The anterior point of division of the lobes of the left lung lies about the fifth interspace below the nipple. The left auricle and the left ventricle, with a small portion of the right ventricle about the apex, lie in the left mammary region; the apex of the heart generally lying immediately above the *sixth* costal cartilage.

The Infra-Mammary Region has a somewhat triangular form. Its boundary alone is defined by the lower bounding line of the mammary region on each side; below, by the margins of the false ribs; inside, by the xyphoid cartilage or middle line; and outside, by the extension of the line from the acromial end of the clavicle to the outer tubercle of the pubes on either side. *Contents of this region.*—On the right side the liver, with the edge of the lung overlapping it in front, to a variable extent during full inspiration. On the left side the stomach and anterior edge of the spleen rise as high as the *sixth* rib in this region; and towards the inner portion of the region the left lobe of the liver lies in front of the stomach.

The Supra or Post-Sternal Region is a small hollow, bounded below by the notch of the sternum, and laterally by the *sterno-mastoid* muscles. *Contents of this region.*—The trachea almost completely fills it; but on the right side the innominate artery lies at the lower angle; and in some persons the arch of the aorta reaches its lower border just at the notch of the sternum, where it may be felt pulsating. The region contains no lung.

The Upper or Superior Sternal Region comprehends that portion of the breast-bone which is superior to the lower border of the *third* rib. It covers the left and a small portion of the right innominate vein. The superior cava runs along its right edge; the ascending and transverse portions of the arch of the aorta; the pulmonary artery from its origin to its bifurcation; the aortic valves near the lower border of the *third* left cartilage at its junction with the sternum, or midway between the mesial line and the left edge of the sternum (the pulmonary valves being a little higher than these, more near the surface, and quite at the left of the sternum); and lastly, the trachea, with its bifurcation, on the level of the *second* ribs. The remains of the thymus gland, with areolar tissue and fat, lie in front of these parts, between the lateral pleural boundaries of the upper V-shaped portion of the anterior mediastinum, thus separating the edges of the lungs above towards their apices.

The Lower or Inferior Sternal Region comprehends the remainder of the sternum, which lies below the level of the lower margin of the *third* rib. *Contents of this region* include the greater portion of the right ventricle, with the infundibulum of the pulmonary artery, and a small part of the left ventricle. The *mitral valve* is situated towards the upper end of this region, close to the left edge of the sternum, on a level with the *fourth* sterno-costal articulation; the *tricuspid valve* lies nearer the middle line, and more superficially. The edge of the right lung descends vertically along the middle line, and at the upper part of the region is a small portion of the left lung. Inferiorly and deeper seated is a portion of the liver, and sometimes of the stomach, while the line of union of the heart and liver corresponds with where the diaphragm intervenes.

The Axillary Region extends from the apex of the armpit above to the line continued which marks the inferior border of the infra-clavicular region. In front it is bounded by the posterior border of the infra-clavicular region, and it extends to the external edge of the scapulæ behind on either side. The region can only be brought into view by lifting the arm over the head, or by carrying it away from the side. The region is hidden when the arm is at rest by the side. *Contents of this region* comprehend portions of the upper lobes of the lungs, a great volume of lung-substance, and, more deeply seated, large bronchi.

The Infra-Axillary Region is bounded above by the region already defined; anteriorly, by the mammary region; posteriorly, by the scapula; and below it extends to the margins of the ribs. *Contents of this region* on both sides are the lower edge of the lung, sloping downwards from before to behind. On the right side is the liver, between which and the walls of the chest is interposed a thin layer of lung-substance during a full inspiration. On the left side are the spleen and stomach.

The Supra-Spinous Regions have the same boundaries as the superior fossæ of the scapulæ, and correspond to the posterior surfaces of the apices of the lungs.

The Infra-Spinous Region, sometimes called the Scapular, is identical with the lower fossa of the scapula. It covers lung-substance.

The Inter-Scapular Region (right and left) lies between the inner margin of the scapulæ, divided into a right and a left region by the vertebral column, from the second to the sixth dorsal vertebra. *Contents of this region* are—lung-substance on each side of the mesian line, the main bronchi, and bronchial glands. On the left side is the œsophagus; and from the *third* or *fourth* vertebra downwards is the descending aorta. The bifurcation of the trachea takes place at the middle line between the two regions, but inclining rather to the right side.

The Infra-Scapular or Lower Dorsal is bounded by the continuity of the transverse line, which forms the inferior boundary of the infra-clavicular region, and which, being continued behind, crosses the inferior angles of the scapulæ and seventh dorsal vertebra. It extends below as far as the twelfth rib, corresponding to the transverse line, carried round, which formed the lower boundary of the *infra-mammary* region in front. *Contents of this region.*—As low as the eleventh rib lie the lungs. On the right side, from the level of the eleventh rib, extending downwards, is the liver. On the left is the spleen, occupying some of the outer portion of the region; while the intestines occupy some of the inner part. Close to the spine, on the left side, is the descending aorta; and on both sides, close to the spine, is a small portion of kidney.

2. Situation of the Organs in the Thorax.—The *outer boundary* of each lung is marked by a line passing obliquely downwards and outwards from a little outside the centre of the clavicle towards the axilla, and then vertically at a variable distance outside the nipple. Each lung rises from half an inch to an inch and a half above the clavicle, the relative height being unequal but variable. The inner margin of each lung passes downwards and inwards from the apex, and meets with the inner margin of the other lung at the middle line, at a point between the first and second cartilages, or at the second.

The inner margin of the right lung continues vertically downwards along the centre of the sternum, or inclining a little to the left side, as far as the attachment of the xyphoid cartilage.

The inner margin of the left lung leaves the right at a point between the *fourth cartilages*, or a little higher or lower than this, and passes nearly transversely outwards for a short distance in the direction of the *fourth costal cartilage.* It then runs obliquely downwards and backwards in the course of a line drawn from the centre of the *fourth costal cartilage*, half an inch to one inch inside the left nipple, as low as the seventh rib.

The lower boundary of the right lung passes somewhat obliquely and then transversely from the attachment of the xyphoid to the sternum, across the cartilages of the sixth and seventh ribs backwards to the spine, which it touches on a level with the *tenth*, *eleventh*, or *twelfth* dorsal vertebræ.

The lower boundary of the left lung is a little lower than that of the right, and passes backwards from the point indicated on the seventh rib, to strike on the spine at a point usually a little lower than that on the right side.

The apex of each lung lies beneath the anterior scalenus muscle and the subclavian artery. The apices of the lungs are separated from each other by the œsophagus, the trachea, and the projection anteriorly of the bodies of the *first* and *second* dorsal vertebræ.

The base of the right lung is hollowed by the projection upwards of the liver, which in the centre of the thorax ascends as high as the *fifth* rib or *fourth* interspace. The liver is also separated from the ribs by the expansion of the lungs between it and the thoracic walls.

The base of the left lung may be also pressed upon by the left lobe of the liver; and it is always hollowed out, though to a less degree than the right lung, for the accommodation of the stomach and spleen, and, to some extent also, the left lobe of the liver.

The *heart* lies between the two lungs in such a way that the right auricle and a part of the right ventricle are covered by the right lung, the rest of the right ventricle being left bare by the divergence of the left lung from the middle line. The left ventricle lies behind the right ventricle, but projects a little towards the left side, where it is uncovered for a short distance, beyond which its left border is covered by the left lung. The region corresponding to the portion of the heart uncovered by the lung is sometimes called the *præcordial* region or space. The *upper boundary* of this space is where the inner margins of the two lungs separate—namely, at the spot between the *fourth cartilages.* The *outer* boundary of the *præcordial* space is indicated by the diverging line of the inner margin of the left lung passing along the *fourth cartilage*, and then obliquely downwards, inside the left nipple. The *inner* margin of the space corresponds to the nearly straight inner margin of right lung, behind the sternum, near the middle line. The *lower* boundary of the *præcordial* space is indicated by a line passing from the junction of the sternum to the xyphoid cartilage, directly to the left, or with a slight inclination downwards. Above this line is the right ventricle, and farther out is the apex of the left. Below it is the left lobe of the liver and the stomach, separated only from the heart by the diaphragm and the pericardium. The *præcordial* region is thus slightly pyramidal in shape, its base being about two and a half inches long, and nearly horizontal. Its inner margin is about two inches long, and nearly straight; its outer margin is from three to three and a half inches long, and has a sloping direction from the apex to the pyramid (at the middle line between the *fourth* cartilages), to the outer extremity of the line indicating the base. This *præcordial space* corresponds to the left half of the lower portion of the sternum, and to portions of the cartilages of the *fifth* and *sixth* ribs; and it may reach even to the junction of the cartilages with their ribs. Its inner and outer boundaries can be marked out only by light percussion; and the lower boundary can only be defined with difficulty by the same means. Below the boundary of the right lung the liver extends to the margins of the right false ribs, or a little below them. On the left side the space between the lower border of the lung and the false ribs is occupied by the left lobe of the liver, the stomach, the spleen, and by a portion of intestine—the colon principally. The left lobe of the liver stretches across beneath the xyphoid cartilage, and below this to a variable extent towards the left side.

3. Changes in the Position of the Lungs.—1. *In Health.* (*a.*) During *inspiration* the lungs expand in all directions; the apices rise higher, and the bases descend lower down; the points of union and of division between the inner margins are in the one case raised towards the apices, in the other case lowered down. The *præcordial* space is thus lessened in size by the advance of the anterior margin of the lungs. (*b.*) During *expiration* the state of things is reversed. The lungs fall from each other; but the point of division between the inner margins may be raised to a level with the *third* rib. The area of the præcordial space is increased. (*c.*) The difference between extreme inspiration and extreme expiration is considerable. In extreme inspiration the inferior boundaries of the lung are often from an inch to an inch and a half lower than they are in extreme expiration. (*d.*) The action of the heart causes a slight difference. Each impulse presses aside the sloping inner margin of the left lung; but this is so instantaneous that it causes no appreciable alteration when the *præcordial* region is mapped out by percussion. (*e.*) During respiration the thorax enlarges in all directions by the movements outwards and upwards of the superior ribs and sternum, and by the movements downwards and outwards of the inferior ribs. *In women* the movements of the upper ribs are much greater than in men, while the abdominal movements are less. The difference is increased by the use of stays; but it does not appear to be altogether owing to these. In boys the costal movements are often considerable: in old age they are diminished. 2. *Changes by Age.*—In children the still considerably developed thymus gland separates the inner border of the lungs at the top of the sternum; and the point where they come in contact (converging from the apex) is lower than in adults. The lungs are also comparatively longer than in adults, and the inferior boundaries are lower down. In old people the lungs often alter considerably in shape, and produce corresponding alterations in position; the lower lobe, particularly in the left lung, becomes more posterior and the upper lobes or lobe anterior. The lungs at last, in old people, become even larger above than below; and when mapped out by percussion, their several boundaries are found to have no certain and constant direction. 3. *Changes by Disease.*—One lung being incapacitated, the other lung undergoes supplementary enlargement; the inferior boundary is lowered, its inner margin is pushed to a variable extent across the median line over the heart, diminishing the *præcordial* space from the right or left side, according as the right or left lung is affected. If one lobe be affected, as by *pneumonia*, *tubercle*, or *cancer*, the other lobe, either upper or lower, as the case may be, is enlarged, and changes its position. In some diseases, as in emphysema, the lung enlarges: and if the emphysema is general, the lungs may meet each other almost at the top of the sternum; may not separate till on a level with the *sixth* rib; may leave the inferior margins at the *seventh*, or even the *eighth* rib; and may give a pulmonary percussion note in the posterior lumbar regions below the ribs altogether. In cases of enlarged heart, or distended pericardium (unless there be coincident emphysema, or unless the lungs are floated forwards by *hydrothorax*), the lungs anteriorly are pushed aside, the point of separation of the inner margin is raised (especially in pericardial effusion), the inner margin of the right lung is thrown to the right side, and the inner margin of the left lung is thrown to the left side. Aneurism of the arch of the aorta, or tumors in the mediastinum, displace the upper portions of the lung; and tumors may even thrust aside and displace the heart. Abdominal diseases, as hepatic and splenic affections, peritoneal effusions, ovarian, uterine, or other tumors, also press up the thoracic organs, and alter their position. By such morbid states the inferior borders of the lungs may be not lower than the *third* intercostal space, or the *fourth* rib; the heart may be thrust upwards and outwards above and outside the left nipple. The student must also be prepared to meet with cases of more or less complete transposition of the viscera.

4. Signs of Disease from the Shape of the Thorax.—The two halves of the thorax are seldom perfectly symmetrical. The right side in the most healthy persons often measures from *half an inch to an inch* MORE than the left; the right *infra*-clavicular space, particularly in right-handed persons engaged in laborious occupations, is apt to be slightly more prominent than the left; the *fourth*, *fifth*, and *sixth* left cartilages often project more than the right; the *infra*-mammary and *infra*-axillary regions may be larger on the left than on the right side; the *infra*-scapular region, on the contrary, is usually larger on the right side, or it may be markedly prominent on both. The nipples (which in adult males are above the upper margin of the *fourth* rib, near its junction with the cartilages) are always equidistant from the middle line, but the left is somewhat lower than the right. Any marked changes beyond these may be due to either—(1.) Disease of the spine, as in *curvature;* (2.) of the spine and ribs, as from the pre-existence of *rickets* in infancy or childhood; or (3) being *pigeon-breasted*, when the sternum projects forward with flattening of the ribs on either side. Rickets leave the chest flat posteriorly as far as the angles of the ribs, with a groove along each anteriorly at the junction of the ribs with their cartilages. If *spinal curvature* and *rickets* are determined not to be present, any general expansions of one side as compared to the other, or general contraction, or (what is much more common) local expansion or bulging, or local contraction, depression, or excavation, become very important signs of intra-thoracic disease. The existence of such conditions may be ascertained by the eye—namely, by "*inspection*," and accurately by measurement with calipers or with tapes, or ingeniously devised instruments, which have been named "*stethometers*" or "*chest measurers*."

General expansion of the thorax is usually produced by effusions of fluid into the pleura, or by extreme cancerous infiltration, or by emphysematous lungs. Much more rarely chronic consolidation will cause general or partial *bulging;* while tubercular deposition at its earliest period has been said also to cause some degree of local prominence; but *retraction* usually follows more or less complete impairment of the functions of the lung, or of a part of it, as in softened tubercle or cancer, and in the period of absorption of pleuritic fluid which has firmly compressed the lung. Heart diseases give rise to local bulging only occasionally in the cardiac region. Aneurisms of the aorta may cause bulgings, while tumors may produce both bulgings and retractions according to circumstances.

5. Physical Examination of the Chest.—1. *By Simple Inspection* —(*a.*) We determine the general shape of the chest; and especially as to the condition of the *supra* and *infra*-clavicular spaces in respect of flatness, fulness, retraction, or bulging in these regions; the condition of the hollow above the notch of the sternum (the supra-sternal space); the form of the clavicles and their curvature; the height and breadth of the shoulders; the form of the sternum, as to whether or not it bends outwards or inwards; the curves of the spine; the position of the scapulæ; prominence of their inferior angles, and the firmness or laxity of the *latissimus dorsi* muscle; the distance of the scapulæ from each other and from the middle line; contracted contour or expanded form of the lateral regions; the width, depression, or bulging of the intercostal spaces; and distance of the nipples from the middle line. (*b.*) We obtain a general notion as to capacity or size of the thorax, relative to the height, weight, and age of the individual, allowing for fatness or emaciation. Practically and independently of all instruments devised for estimating the capacity of the lungs, one of the best modes to determine what the patient can do with his lungs is to make him count *one*, *two*, *three*, *four*, *&c.*, on till he has no more breath left in him to count without "*fetching a breath.*" By practice he may now and then count more than he did when he first made the attempt; but every one has a number to which they can thus reach, normal to themselves, when the lungs are efficient in capacity. (*c.*) We observe the thoracic movements, and estimate in seconds the time taken to complete the inspiratory and expiratory acts; compare the movements of the two sides of the thorax, and also the abdominal respiratory movements with those of the thorax, so as to notice if either takes an undue share in the work of respiration. If the ribs scarcely move, and the parietes generally of the thorax remain at rest, while the surface of the belly rises and falls alternately with the respirations, the act is called *abdominal respiration*, because the abdominal muscles seem to take the larger share in its performance; but if, on the other hand, no motion of the abdomen is visible, the act of respiration is then said to be *thoracic*. Observe whether the whole acts of respiration are quicker or slower than natural—*i.e.*, more or less than *eighteen* to *twenty* per minute, or one to every four arterial beats. Note their frequency per minute. Observe whether they are calm, easy, and fully drawn, or short, forced, hurried, and incomplete, attended by indications of pain, checked or partially arrested by cough. Notice whether respiration is performed through the mouth or nose, or both; and whether the *nares* dilate and contract at each respiratory effort, with any constrained movement of forcible expansion. Note any sensible odour or vapour of the breath, and also its temperature.

2. *By Measurement.*—The use of tape or calipers in deep and medium inspiration and expiration will detect any differences between the two sides, or undue differences in the size of the chest at different times. There is about one inch of an average difference in favour of the right side of the chest compared with the left, which is consistent with a normal state of the region. A convenient plan is the double tape, formed by joining two common measuring tapes together, so that the beginning of each may be the centre of the tape when joined. By putting the line of junction of the two tapes upon the spine, and holding it there exactly, the tapes can be carried round either side of the body, and the circumference of each side read off simultaneously. By taking the size at full expiration and full inspiration, the extent of *expansion* is determined, as well as the absolute and relative size of each half of the thorax. The measurements (besides the circular) which are most useful are the distance of the nipples from the middle line—their distance from the sterno-clavicular articulations of each side—and the distance of the centre of the calvicle from the lowest point of the false ribs in the vertical line. The difference in the measurement between the fullest inspiration and the fullest expiration gives the general expansion of the lung. In health both lungs expand nearly equally from *three-quarters of an inch to an inch and a half;* or the right may expand a little more than the left. If there is any deficiency

of expansion, there must be disease of some kind, but the nature of the disease cannot be known without additional signs. Local expansion is most accurately determined by the eye, the hand. and the chest-measurers of Drs. Quain, Sibson, Henry Thomson, or Leared; the exact levels of the measurements being always noted. All these instruments essentially consist of dials, with indices moved by mechanism, connected with tapes passing round one or both sides of the chest—so many revolutions of the index indicating on the dial so many tenths and hundredths of an inch of expansion of the chest. All "*chest-measurers*" must be submitted (as *percussion* and *auscultation* are) to the test of comparison between the two sides—the difference which the heart causes between the two sides being also remembered. It is necessary in all these observations so to divert the patient's attention as to cause him to look away from the instruments, otherwise the movements of the chest may become so affected as to vitiate the results.

3. *Palpation*, or the application of the hand, affords more extended information than simple inspection, such as of the intercostal distances, lateral and antero-posterior; expansion of the chest in the acts of respiration; appreciation of *vibrations* communicated through the walls of the thorax. The palm of the hand applied to the chest in a healthy state during the act of speaking will appreciate a most delicate *vibratile tremor* (commonly called *fremitus*), more marked according to the graveness, coarseness, and loudness of the speaking voice, cry, or cough. The intensity is generally greater in front than behind, on the right side than on the left, and is stronger towards the sternal than the humeral halves of the region below the clavicles. In disease the *fremitus* on the two sides of the chest must be compared. It is usually *increased* by whatever consolidates the fine vesicular texture of the lung, without obliterating the bronchial tubes. It is *diminished* by the intervention of liquid or air between the lung and the thoracic walls; also by such extensive consolidation of the lung-substance as to fill up the smaller bronchial ramifications leading to the air-vesicles. *Vocal fremitus*, or *vocal vibration*, is observed by placing the hand over the surface of the chest of a person speaking. It is a delicate vibration, easily deadened by the too forcible pressure of the hand. It is more marked in adults than in children, and in males than in females. It is more intense in long-chested than in short-chested persons; and markedly so in thin than in fat people; and is stronger in recumbency than in the sitting posture. A *rhonchial fremitus* may sometimes be heard, when certain *rhonchi* throw the bronchial tubes

into vibrations sufficiently strong to be felt on the surface of the chest. The sibilant sonorous and mucous rhonchi have all this property. *Friction fremitus* may be felt by the hand, when the gliding motion of the pleural surfaces upon each other is attended by a perceptible vibration, by the collision and friction of plastic matter upon the surfaces. Ordinary fluctuation may sometimes be detected by the hands, combined with shaking or suddenly altering the position of the chest, as by *succussion.* The hand is also used to appreciate the action of the heart, the apex of which, after full *expiration*, is felt to beat between the cartilages of the third and fifth ribs, and at the neighbouring part of the sternum, immediately below and to the outside of the left nipple. After a full inspiration it may be felt as low as the sixth rib. The frequency of the respirations may also be counted by placing the hand, applied to the surface below the clavicles in the female, and below the epigastrium in the male.

4. *By Percussion.*—The position of the organs, as stated in the previous section, is ascertained during life principally by the signs derived from percussion; that is, from the nature of the sound produced by striking over the lung either "immediately," as when the chest is gently tapped with the hand or a light hammer; or "mediately," as when a flat body is placed upon the chest, which is then struck by the finger or the hammer. The main object of percussion is to determine the comparative density or dulness of subjacent parts. *Mediate* percussion is employed almost to the exclusion of immediate. The body which is interposed between the hammer and the chest is called a "*pleximeter*," and consists simply of a flat piece of ivory, wood, vulcanite, or india-rubber, or of the index and middle finger of the left hand laid flat upon the chest. The hammer is made of a piece of whalebone, or of light steel, armed at its head with a piece of india-rubber; or the flat edge of the stethoscope encircled by a piece of india-rubber; or it consists of a light thimble covered with vulcanised india-rubber; or the points of the index and middle fingers of the right hand may be used for the purpose of a hammer, the nails being cut close. This latter arrangement forms the best of all hammers, while the index finger of the opposite left hand forms the best pleximeter.

Mode of Percussing.—The pleximeter (or finger used as such) is to be placed flat upon the chest, and held close to the walls. It is then to be struck perpendicularly, and with gentle or moderate force. If the fingers of the right hand be used as the hammer, the blow should be given from the wrist only, the elbow and shoulder being quite motionless. The force of the blow must vary according to circumstances.

In the supra-clavicular spaces the finger, if it be used as a pleximeter, should be pressed closely into the triangular space, and the blow should fall in the direction of a line passing to the centre of the chest—namely, downwards, forwards, and inwards. If the blow be directed too much forward or backward, it strikes on the clavicle, or the parts at the back of the neck, and the "pulmonary percussion note" is not obtained. The clavicles are best percussed *immediately*, first at the sternal and then at the acromial end. In the *supra-spinous* spaces the blow should fall downwards, inwards, and forwards. Over the rest of the chest the pleximeter may be placed in any direction, provided that corresponding points shall be struck on the two sides; as a slightly different note is given out, especially in thin people, by the intercostal spaces and the ribs. If the spaces are struck on one side, they should also be similarly, or with like force, struck on the other.

The "*pulmonary percussion note*" is the sound given forth by striking on a part of the chest-wall below which lies a considerable depth of lung. The sound produced depends upon the vibrations of the air the lungs contain, and also upon the vibrations of the walls of the chest. The pulmonary substance vibrates but little; it is non-sonorous, and acts rather as a damper of sound. The qualities of sound to be noted are—(1.) *Amount in intensity of resonance*, commonly called *clearness;* (2.) *duration of the sound;* (3.) *pitch;* (4.) *volume of sound.* The intensity of sound is diminished by the lessened vibration of the walls of the chest, as in pleuritic effusions; or by the lessened vibration of the air, the air being lessened in amount; or by increase in volume of the lung-substance, as by exudation. The physical conditions which lessen the quantity of air are—(1.) Consolidation of lung-substance from any cause, such as exudation, tubercle, great congestion, or œdema; (2.) compression of the lung from fluid in the pleura, or by tumors. When the pulmonary percussion note is exaggerated, it may become what is commonly termed "*tympanitic;*" that is, a very clear sound, of less volume, but of higher pitch than the pulmonary percussion note. It is similar to the sound obtained by striking the abdomen when the intestines contain air, or a bladder moderately distended with air. It is generally caused by an increased quantity of air in the lung tissue or in the pleura, as in pulmonary emphysema, or when cavities exist in the lungs in pneumo-thorax. A very thin and flexible wall will often give a tympanitic character to the pulmonary percussion note. There are some exceptions to these statements, namely—(1.) When the air is not apparently in excess, a thin layer of sound lung full of air, lying over hepatised lung, will give forth the sound; (2.) the upper lobes of the lung when hepatised in the lower lobes will also give forth the sound; and (3.) when the lung floats on the surface of pleuritic fluid. *Tubular* sounds are produced when the lung is consolidated, covering bronchial tubes. In pleurisy the intensity of sound is diminished from both causes. The sound is intensified or made more clear by whatever increases the vibrations of the walls of the chest, as in thin children, or in persons becoming thin, and by increased vibrations of air in the lungs. The clearest sounds are obtained from the anterior regions, where the walls are thin; the least clear from the posterior, on account of the thickness of the walls. *In the supra-clavicular region*, the resonance ought to be very clear, approaching a tympanitic sound over the clavicle, clearest in the middle third; of high pitch in the inner third; but duller towards the scapular end. *In the infra-clavicular region*—between the clavicle and superior margin of the fourth rib—the sound ought to be very clear, and typically pulmonary; less clear and shorter, but of higher pitch, on the right than on the left side. *On the right side*, from the fourth rib downwards to the sixth or eighth (where the liver is reached), the sound on strong percussion is less clear, till it abruptly becomes flat. *On the left side*, from the fourth to the sixth rib, and from the nipple to the sternum, the sound is dull, from the presence of the heart; except in cases where the lung overlaps the heart in inspiration; where the heart is small, and where emphysema of the lungs exists. Below these points, on the left side, the sounds of the chest anteriorly are variously modified by the encroachment of the left lobe of the liver, by the spleen, or by gaseous distension of the stomach, over which the sound may be tympanitic, and dull on the inner and outer parts of the region over the more solid organs just named. *Laterally*, when the arms are raised, the axillary regions on both sides are highly sonorous. *On the right side*, the right infra-axillary region is clear to near the sixth or eighth rib, when it becomes suddenly dull over the liver, the line of hepatic dulness varying during inspiration and expiration. *On the left side*, the sound may be more or less dull, from enlargement of the spleen; but when the stomach is distended with gas, it may be tympanitic. *Posteriorly*, the scapular regions give a clear sound, though much less clear than the corresponding anterior and lateral regions. The *infra-spinous* region is more sonorous than the supra-spinous. The *infra-scapular region* (especially over a portion of the bend of the ribs, uncovered by muscle when the arm is extended) gives a very clear percussion sound. *On the right side* BEHIND, the line of hepatic dulness is at or near the eleventh rib; but strong percussion will elicit a flat sound an inch or more higher up. *On the left side* BEHIND, there may be tympanitic resonance from gas in the stomach, about the seventh rib; and, about the ninth rib, dulness from the spleen. In the *inter-scapular region*, clearness and duration of sound are lessened from the increased resistance of the mass of muscles.

5. *By auscultation*, or the "act of listening" to the sounds produced by the lungs or by the heart. For this purpose the ear is applied to the surface of the patient's chest directly—*immediate* auscultation; or a conducting medium—such as an instrument called a *stethoscope*—is interposed between the ear of the listener and the patient's chest; the auscultation is then said to be *mediate*—the sounds being transmitted through the *stethoscope*. Such *mediate* auscultation is especially necessary when the sounds listened to are limited to a small and defined region, such as the sounds of the heart. The ear-piece of the stethoscope ought to fit the ear of the listener; and when a well-made stethoscope has been once selected, and an ear-piece chosen which fits the ear comfortably, the student should keep to that one, and familiarise himself with its use. A double or bin-aural stethoscope is also sometimes of use in the differential diagnosis of sounds which are obscure from their lowness, or in cardiac diagnosis when the heart's action is rapid or irregular, when the first sound is indistinct at the apex, or cannot be identified with the apex beat; or when the second sound is indistinct, or when it is audible only at the base. But whatever form of stethoscope is used, all of them require much practical study and experience to use them with success. Four circumstances affect the quality of a stethoscope:—(1.) *The material which allows the least amount of sound to be lost, and least of all perverts or modifies the sound*, is the best for a stethoscope—namely, some *porous* wood which is a good conductor of sound. *Cedar* and *deal* are the best woods for the purpose. The denser the wood the more are the sounds apt to be modified; therefore *ebony* is to be condemned. (2.) *The stethoscope should be of one piece of wood*—turned, in fact, out of a solid block. It ought not to be part ivory and part cedar. (3.) *As to length and thickness*, the length most convenient is that which permits the instrument to be carried in the crown of one's hat; and it may be solid if the wood is very porous; but generally it is hollow. (4.) *The chest end* should be small, not larger than *one inch and a quarter* in diameter; because the smaller it is, the greater is its localising power, and the narrower are the limits within which the seat of any particular sound can be determined. The chest end of the stethoscope should also be narrow, and smoothly rounded over the edge. (5.) The

ear-piece should be *large* and *flat*, to secure apposition and occlusion; but in this respect each man must fit his own ear. The measurements ought to be—length, seven inches; diameter of ear-piece, three; diameter of chest end, one and a quarter; circumference of shaft, one and a quarter. The main object of the stethoscope is to *circumscribe* and localise the sounds that we hear; the chest end of the instrument should therefore be as small as possible, in order the better to appreciate the precise seat of the greatest intensity of sound. To ascertain this, the instrument should be "worked towards the sound," and then "from the sound," right and left, up and down, till its end is on the exact spot whence the sound proceeds in its greatest intensity. By working the stethoscope round and round, and gradually contracting the circle, the *area* of the sound can be ascertained; and hence so far the lesion producing it can be localised.

Auscultation in children, who are apt to be frightened by the appearance of an instrument, is in general better effected by the ear directly applied firmly and accurately to the chest. Very young children must be held in the nurses' arms, so that the chest may become prominent, and the ear of the examiner be conveniently applied. The manner of breathing should be first noted, whether by the mouth or nose, abdominal or thoracic. Vocal resonance can best be estimated when the child is crying—the cry replacing the voice. The maximum intensity of respiratory murmur is, *anteriorly*, from the clavicle to below the nipple, on the right side, and not quite so far down on the left; *posteriorly*, the inferior part of the interscapular region; the minimum as in adult. *Immediate auscultation* is both simple and easy, and ought to be learned and practised by the student in every case where it is practicable; although, for reasons of delicacy, fastidiousness, or filth on the part of the patient, it may be necessary to have recourse te the stethoscope. But in many suitable cases the chest can be more quickly and quite as satisfactorily explored by *immediate* as by *mediate* auscultation.

(*a.*) *Auscultation in health.*—A verbal description of the sounds to be learned by auscultation is difficult, because the impressions made on the senses of one person cannot be communicated exactly by language to another; and the distinctions which subsist between the sounds heard in health and those in disease are not yet regarded as similarly significant by all; nor is their individual importance yet clearly determined in relation to practice. The examiner must learn first to appreciate the *natural sounds of respiration and vocal sounds*, so that he may be able to detect such *modifications* or *changes* of them which amount to physical signs of disease. The *healthy vesicular murmur* of the lungs is a diffused, soft murmur, of a breezy, sighing character, increasing in intensity with the rapidity and force of respiration and prolonged by a full inspiration, whose probable site of production is the air-sacs of the lungs and terminal portions of the bronchi. It is due to vibrations caused by the entrance and exit of the air. It is divisible into two sounds, appreciably separated from each other—the *sound or murmur of* IN-*spiration*, and the sound or *murmur of* EX-*piration.* The EX-*piratory murmur* is shorter, less intense, of lower pitch, harsher, and more hollow than the IN-spiration on the *left* side. In some it is said to be altogether absent on that side. The duration is usually not above *one-fourth* the length of IN-spiration; but it is increased in old people, while its intensity is less and more prolonged in the right clavicular region than in the left. The intensity of the vesicular murmur varies in different healthy persons. It is loud and well-marked in infancy, childhood, and women—so loud as to be distinguished by the distinctive name of "*puerile respiration.*" It becomes more subdued in adult age; and in old age it is frequently very feeble, and known as "*senile respiration.*" Generally it is greater in the female than in the male in the upper regions of the chest. The sounds of respiration heard from the bronchial tubes, especially over the region of the bifurcation of the trachea, the upper part of the sternum, and between the scapulæ are named *tracheal* or *tubal.* The sound is that of blowing, as by air passing quickly through a tube; and it has a higher pitch than the vesicular sounds. There is generally a perceptible interval between the sound of bronchial *in*-spiration and *ex*-piration; and the duration of *ex*-piration is as long, or nearly as long, as that of *in*-spiration.

Auscultation of the voice.—The sounds of the voice, as they are transmitted through the chest, are modified by the size of the tubes and the nature of the substance through which they pass, and so become signs of the condition of the organs transmitting them. The naked ear should be used, and the patient instructed to count *one*, *two*, *three* slowly, distinctly, and moderately loud, and to repeat these numbers as often as is necessary. Over the trachea the voice seems concentrated, coming into the ear of the explorer: it is more or less distinct, resonant, and gives the sensation of a peculiar shock and thrill or fremitus; this is called *treacheophony.* The phenomenon of the direct entrance of articulated words into the ear at the point auscultated is called *pectoriloquy.* When the stethoscope is placed over the thyroid cartilage, and the patient is directed to speak, the voice will be found to be transmitted generally with less intensity, shock, and vibration, than from the trachea; this is named *laryngophony.* On listening over the chest, either immediately or mediately, to the sound of the voice, articulated words are not heard, and the resonance is less intense than over the trachea, more diffused, seems farther from the ear, and usually the shock is wanting. Over certain parts of the chest, in many instances, there is no thrill or fremitus; but differences exist in different persons in the several regions, and in the corresponding regions of the two sides. Over the first divisions and subsequent larger subdivisions of the trachea,—the larger bronchial tubes (as on each side of the upper part of the sternum, at and between the scapulæ, and in the axillæ), there is still considerable vocal resonance, though diffused and conveying the idea of distant origin, and frequently some obscure thrilling sound of the voice or fremitus; this is natural *bronchophony*, or pectoral vocal resonance. Such resonance is more marked in males than in females, and in adults than in children. Generally the articulate sounds of the voice are obscured as they are traced downwards through the trachea and bronchi; being obscured, intercepted, weakened, or diffused by passing through the spongy, pulmonary vesicular tissue, to reach the surface of the chest.

(*b.*) *Auscultation in disease.*—Modifications of the *respiratory* murmur in diseased conditions of the lungs mainly consist of changes in its *duration* and *intensity*, and changes of a special character. Its *duration* and *intensity* may be—(1.) Exaggerated or puerile; (2.) weak or senile; (3.) the sound may be suppressed altogether. The sound of respiration is *exaggerated* or *puerile* when it is simply increased in intensity or loudness, without change in *quality*, *pitch*, or *rhythm.* When due to disease the excess of intensity is with the *ex*pirations; when in health the excess is with the *in*spirations. When the number of inspirations are at the same time increased from disease, combined with puerile respiration, the excessive intensity of sound indicates disease in a portion of the lung more or less distant, or of the opposite lung, such as the solidification of *pneumonia*, *tubercle*, *carinoma*, *pulmonary apoplexy;* in consolidation from deprivation of air, such as blocking up of bronchi from plastic exudation, pressure of an enlarged bronchial gland, so as to occlude the air-tubes, or in cases of *pleurisy.* The respiratory murmur is *weak* or *senile* when its intensity is diminished and feeble. It is a sign which often marks the site of a local lesion. The expiratory sound is then rarely heard, except in emphysema. The murmur may be feeble from imperfect production; or from its reaching the ear through some solid or liquid between the lung surface and the chest wall. When limited to apices of lungs, and accompanied by diminished resonance, it generally denotes tubercles; in anterior, superior, and middle regions of the lungs, with increased resonance, it denotes emphysema; when heard at the base and remote, with dulness on percussion, it indicates pleurisy. The absence or suppression of the respiratory murmur is a valuable sign of pleuritic effusions. Modifications of the respiratory murmur denote disease when its character is—(1.) *Harsh;* (2.) *bronchial* or *blowing;* (3.) *cavernous;* (4.) *amphoric.* A harsh respiratory murmur is associated with the condensations of the lung and pleuritic effusions—the degree of condensation not being such as to abolish vesicular respiration. Bronchial or blowing respiration is also heard in cases of dilated bronchi, with induration of lung tissue. Respiration is *cavernous* in character when the sound resembles that produced by blowing into a hollow cavity; and it denotes a cavity or globular bronchial dilatation. Respiration is said to be *amphoric* in character when it resembles the sound produced by blowing into a large cavity with thick walls, filled with air, through a narrow neck, as that of a glass bottle. The sound is metallic and musical. It is heard in pneumothorax, with pulmonary fistula and large tubercular cavities.

Thoracic sounds of a morbid type, sometimes called "râles" or "*rhonchi*," are also evolved during the acts of respiration from the air-tubes, air-sacs, or from cavities formed in the lung tissue in the course of disease. They are suggestive of a *dry*, or *moist*, or *intermediate* character. (1.) *Dry*, *vibrating* sounds of a *high pitch* (*sibilant râle* or *rhonchus*), having a variable intensity and duration, and of irregular recurrence, co-existent with inspiration and expiration, but especially marked with inspiration, are generally produced by the passage of air over a local accumulation of viscid mucus in cases of pulmonary emphysema and bronchitis. Clicking, whistling, and hissing varieties are described. Similar sounds of a *low pitch* (*sonorous râle* or *rhonchus*) are of a musical, vibratory, deep and grave tone, attended with fremitus of the walls of the chest over a variable surface. *Snoring*, *humming*, *cooing bass notes* are its varieties. They co-exist with inspiration and expiration, but are especially marked in *ex*piration, to which they may be limited. They arise in the larger bronchi, and are essentially associated with bronchitis.

(2.) *Crepitant* or *crepitation râles* or *rhonchi* convey the idea of very fine sounds, like that produced by rubbing slowly and firmly between the finger and thumb a lock of one's hair near the ear. The sounds are numerous and sharp, conveying the idea of minute size and dryness; co-existing exclusively with *in*spiration, and at first towards its close only. They denote the existence of primary idiopathic pneumonia, and constitute the crepitation of early pneumonia, or of the pneumonic state established round tubercles. Crepitant sounds of a moist, crackling, or bubbling nature, convey the idea of being less fine, few in number, and evolved slowly, unequal, dissimilar, and irregular in occurrence, are audible in inspiration and expiration, but pertain chiefly to inspiration. They are probably due to the bubbling of air through fluid contained in the minute bronchi, and co-exist with the resolution of pneumonia.

(3.) *Bubbling* or *mucous râles* or *rhonchi* convey the idea of the bursting of bubbles of some size, but unequal, and varying in number, and in fineness and coarseness of expression. They co-exist with inspiration and expiration, and are modified by coughing and expectoration. They seem to be produced by the bubbling of air through liquid (mucus, blood, or pus) in bronchial tubes, of about the size of a crowquill. They are heard mostly in the centre or middle parts of the lungs, and denote bronchitis after secretion has become established. There are subcrepitant or submucous varieties of these sounds, which resemble the bursting of more minute bubbles, producing weaker sounds, and predominating during inspiration. They are produced by the bubbling of air through viscid fluid in the minute bronchial tubes near their peripheral distribution. They are associated with capillary bronchitis of both bases of lungs, tubercular bronchitis of apex, and the resolution of pneumonia. *Cavernous rhonchi* or *gurgling râles* are another variety of bubbling mucous sounds, like the bursting of bubbles of obviously large size, with a hollow, gurgling sound, or a metallic sound if the bubbles be small. They co-exist with both acts of respiration; are caused by the bursting of bubbles in a hollow space enclosed by more or less dense and smooth walls—the more so the more perfect the gurgling; and are associated with excavations or cavities in the lungs, dilatations of bronchial tubes, or pus in the pleura, with a bronchial fistula.

(4.) *Clicking*, *crumpling*, or *crackling* sounds convey the idea of dryness, and then of a thickly-moist or gummy secretion. The moist sounds have the character of successive clicks, few in number, tending to pass into bubbling rhonchi during expiration. They co-exist with both acts of respiration, but are more regular and distinct during inspiration. They probably originate in the interior of tyromatous softenings, just commencing to communicate with the minute bronchi. The *drier* variety of these sounds are produced by a succession of three or four minute, dry, short, sharp, crackling sounds, permanent in many cases when once established, although they may disappear for a day or two and again recur, and co-existing exclusively with *in*spiration. They seem to be evolved at a distance from the surface, generally in the *infra-clavicular* and *supra-clavicular* regions.

Thoracic sounds of a morbid type are also heard in disease of the membrane investing the lungs, and are known as "*pleural friction sounds.*" They are of a grazing, rubbing, grating, or creaking character, conveying the sensation of friction by a series of abrupt jerking sounds, rhythmical with respiration, superficial in seat, limited in extent, attended with *fremitus* palpable to the hand, and often perceptible to the patient. They are heard during both respiratory acts, and indicate roughness of the surface of the pleura.

Sounds of a morbid type are also evolved during *the act of articulation of the voice* in diseases of the lungs and pleura; as when the natural voice is heard in unnatural sites, or when the natural bronchial resonance is altered. (1.) The intensity of the resonance of the voice may be exaggerated, as in *bronchophony*, unattended by articulate sound, but merely diffuse or concentrated. It is due to increased density of the lung tissue surrounding pervious bronchi with enlarged calibre and hypertrophy of the substance of the tube. The more homogeneous this consolidation, the better is the sound transmitted; and it is usually associated with hepatisation of lung, dilated bronchi, pleurisy, with effusion when hepatisation co-exists. (2.) *Pectoriloquy* occurs when there is complete transmission of articulate words from the walls of the chest into the ear of the listener, the resonance being generally circumscribed and limited. It is produced when solid masses of lung lie between a large bronchus and the chest walls; when a moderate sized excavation exists with a smooth and dense internal surface. (3.) *Amphoric resonance* of voice is that of a ringing metallic sound reverberating through a cavity, and resembles the sound produced by speaking into a broad-mouthed empty pitcher. It is produced by the voice reverberating in a cavity communicating with a bronchus by a small aperture, and chiefly in phthisis. (4.) *Ægophony* is a vibratory, tremulous, cracked, and irregular sound, limited in seat, comparable to the bleating of a goat or to the voice of Punch in the sensational melodrama of that ancient and popular exhibition. It is synchronous with the articulation of each word, or like an echo feebly whispered from a distance, and appears to flutter about the end of the stethoscope applied to the chest. It is produced when a stratum of fluid contained in the pleura compresses the lung; the voice in the bronchial tubes is thus rendered more distinct by compression, and is thrown into vibration by the layer of fluid on its transmission to the ear of the listener. It occurs during the early stage of pleurisy, when effusion is small in amount and equally diffused.

Heart's Sounds in Relation to Diseases of the Lungs.—When the lungs are healthy, the intensity of these sounds is directly as the distance of the point at which they are examined from their centre of production. In some diseases of the lungs the conducting power of the media being changed—increased or lessened—the intensity of heart's sounds will be increased or lessened.

6. Relation of the Parts of the Heart and Great Blood-vessels to the Walls of the Thorax.—A knowledge of the exact position of the several parts of the heart, particularly of its valves and orifices, and of their relation to fixed points on the surface of the chest, is essential to accurate diagnosis. The size of the heart, and of its several parts, may thus be relatively determined in the living subject: so also its relative position, and any amount of displacement it may have undergone, and whether or not its valves or orifices are diseased. The base of the heart, being the most fixed part, is the most convenient place from which to trace the outline of the heart, and to determine what parts correspond to certain fixed points upon the surface of the chest. The heart is situated obliquely in the cavity of the thorax, from above downwards, from before backwards, and from right to left. It lies behind the middle and lower bone of the sternum, also behind the cartilages of the third, fourth, and fifth right ribs, near the sternum, and the cartilages of the third, fourth, fifth, and sixth ribs on the left side, in front of the bodies of the sixth, seventh, and eighth dorsal vertebræ. It rests immediately above the diaphragm upon its cordiform tendon, the serous layer of the pericardium only being interposed. Owing to the obliquity of its position, the *line of the base of the heart* looks upwards and backwards towards the right shoulder, and is on a line with the interval between the cartilages of the second and third ribs. *The apex* points downwards and forwards towards the space between the cartilages of the fifth and sixth ribs on the left side, where its impulse may be felt.

The region of the heart's superficial dulness is known as the *præcordial* region, the limits of which correspond to a vertical line through the centre of the sternum, and about the middle of the bone nearly on a line with the cartilage of the fourth rib. The edge of the left lung separates from this middle line, and passes obliquely to the left side—thus exposing a small portion of the pericardium, which is uncovered by lung. The exposed surface has a triangular shape; the apex above, the base below. The parts of the heart thus exposed beneath the pericardium are a part of the left ventricle, near its apex, and a portion of the apex of the right ventricle. This triangular *præcordial* space is on a plane below the nipple and the fourth rib. Its base is on a line with the cartilage of the sixth rib; its right boundary nearly a vertical line through the centre of the sternum; its left boundary is an oblique line through the cartilages of the fifth and sixth ribs on the left side. Within these limits the heart is in contact with the parietes of the chest, yielding a characteristic sound to percussion.

The pericardium or sac which encloses the heart has a pyriform shape, the base below, the apex above, exactly the reverse of that of the heart. Thus, the *base of the pericardium* is on a line with the upper part of the xyphoid cartilage; *its apex* is a short distance above the origin of the large vessels, and generally on a line with the articulations of the cartilage of the second ribs with the sternum; but may extend as high as the level of the articulation of the first ribs with the sternum. The sac is wider at the centre (corresponding to the greatest transverse diameter of the heart) than it is at the base; and towards its centre it extends more towards the left side. *The line of the base of the ventricular portion* of the heart is from three to three and a half inches below the clavicles (left and right respectively), and on a line with the junction of the cartilage of the third left rib and fourth right rib with the sternum. *The line of the base of the left ventricle* rises as high as a line drawn across the junction of the cartilage of the *third left* rib with the sternum—*i.e.*, about three inches below the clavicle on that side. *The line of the base of the right ventricle* corresponds to a line across the upper margin of the junction of the cartilage of the *fourth right* rib with the sternum—*i.e.*, about three inches and a half below the clavicle on that side. *The impulse of the apex of the heart* is to be felt between the fifth and sixth left ribs, near where the body of these ribs joins the cartilage. The apex is a little below the fifth left rib, slightly to the left of its junction with its cartilage, and on a line with the articulation of the xyphoid cartilage with the sternum. The nipple in the male is a useful guide. It is usually upon the fourth rib, or over its upper or lower edge, a little more than an inch to the left of the junction of the rib with its cartilage. The edge of the left ventricle reaches the nipple on the left side.

The length of the ventricular portion of the heart is determined by the length of a line drawn from the middle of the sternum, between the cartilages of the third ribs, to below the fifth left rib, slightly to the left of its junction with the cartilage. The greater part of the *right ventricle* lies behind the sternum: at its upper part it extends slightly to the right of this bone, a small portion extending under the cartilages of the fourth and fifth right ribs close to the sternum. Its apex is to the left of the sternum, a little above the apex of the heart; and a part of the right ventricle extends under the cartilages of the fourth and fifth right ribs, close to the sternum. The inferior margin of the right ventricle is nearly on a line with the junction of the xyphoid cartilage and the sternum. The anterior wall lies immediately under the sternum. It is overlapped at its upper portion by both the right and the left lung. The *left ventricle* is covered by the left lung; and all its anterior surface is to the left of the sternum, extending from the cartilage of the third left rib to the interspace between the fifth and sixth left ribs, near where the cartilage joins the body of these ribs. It lies between the sternum and the nipple on the left side, to which its left margin reaches.

The *right auricle* lies to the right of the sternum, entirely covered by the right lung. Its appendix lies behind the cartilage of the third right rib, its tip rests against the right side of the ascending portion of the arch of the aorta, and is on a line with the pulmonary valves. The *left auricle* is entirely covered by the left lung. Its appendix is the only portion seen when the pericardium is laid open. It lies behind the cartilage of the third left rib, close to the sternum, resting against the left side of the commencement of the pulmonary artery. The line of the base of the auricles is on a line with the interval between the junction of the second and third ribs with the sternum, the greater portion of it being under the sternum.

Relative Position of the Orifices, Valves of the Heart, and Great Blood-vessels.—(1.) The *right auriculo-ventricular orifice* lies behind the centre of the sternum, on a line with the lower margin of the articulation of the cartilages of the fourth rib with the sternum. (2.) The *left auriculo-ventricular orifice* is on the same level, but on a plane posterior to the right. It lies behind the cartilage of the fourth left rib, near to or behind the sternum. (3.) The *valves of the pulmonary artery* are on a line with the space between the cartilages of the second and third ribs to the left of the sternum, and very close to this bone. In some instances they may lie a little lower down—namely, on a line with the junction of the cartilage of the third left rib with the sternum, and immediately under it. (4.) The *aortic valves* lie behind the sternum, on a line with the junction of the cartilages of the third rib with the sternum, and towards the left edge of this bone. When the valves of the *pulmonary artery* are situated lower down, the *semilunar valves* of the aorta will be lower also, and on a line with the interval between the insertion of the cartilages of the third and fourth ribs. (5.) A line drawn across the inferior margin of the third ribs corresponds to the *base of the valves of the pulmonary artery*, and to the *free border of the aortic valves.* (6.) The *right ventricle* ascending higher than the left, *the orifice of the pulmonary artery* is on a plane higher than that of the aorta; hence the *pulmonary orifice* is the highest up, as well as the most anterior, of all the orifices of the heart. (7.) The *aortic orifice* lies behind the pulmonary orifice, but on a lower plane. (8.) The *left auriculo-ventricular orifice* is immediately behind the aortic orifice, but on a lower plane. (9.) The *right auriculo-ventricular orifice* is nearly on the same plane as the left, but more anterior, about three quarters of an inch lower than the pulmonary orifice. (10.) The *ascending portion of the arch of the aorta* curves to the right of the sternum, between the cartilages of the second and third ribs. In this part of its course it is still within the pericardial sac, and (in the dead subject) lies at the depth of an inch and a half from the surface, the margin of the right lung and the pericardium being between it and the parietes of the chest. (11.) The *transverse portion of the arch of the aorta* crosses the trachea at the centre of the first bone of the sternum, on a line with the lower margin of the articulation of the cartilages of the first ribs with the sternum, and at a still greater depth from the surface. (12.) The *arch of the aorta* approaches most closely to the parietes of the chest at the point at which the *arteria innominata* comes off—i.e., *on a line with the junction of the cartilage of the second right rib with the sternum.* (13.) The *origin of the pulmonary artery* is on a line with the junction of the cartilages of the third ribs with the sternum. The tip of the left auricle rests against its left side. The pulmonary artery ascends about two inches before it divides; and at that point a portion of the margin of the vessel comes to the left of the sternum between the cartilages of the second and third ribs. The division of the artery is on a line with the upper edge of the cartilage of the second ribs where they join the sternum. (14.) The *ascending vena cava* passes through the diaphragm by an opening, which corresponds to the upper part of the xyphoid cartilage. (15.) In various morbid states the apex of the heart is formed by the *right ventricle* alone, or by the right and left together: in hypertrophy of the right side, for example, associated with *bronchitis* or with *emphysema.* When the right ventricle chiefly enters into the formation of the apex of the heart, the apex is then broad and rounded, rather than of the normal conical form, and is evidence of long-standing pulmonary obstruction.

7. Mode of Examining the Condition of the Heart.—In order to determine the nature, the situation, and extent of morbid changes in the heart, it is necessary to be able to recognise readily any alteration in the heart's impulse, either as regards its strength or the situation in which it is felt—also to be able to detect any difference in the extent and degree of the heart's superficial dulness, or any change in the character of its sounds different from those which are normal.

The *inspection* of the external surface of the thorax, and the application of the hand—*palpation*—to the *præcordial* region should never be omitted. Positive information is obtained by these two methods of examination, which mutually assist one another. The exact point at which the apex of the heart comes in contact with the parietes of the chest may be determined simply by inspection. The *strength* or *feebleness* of the impulse of the heart is to be determined by the application of the hand. *By inspection* it is ascertained whether the two sides of the thorax are symmetrical; and (in connection with cardiac diagnosis) whether there is any bulging in the *præcordial* region, or any unusual pulsation at any part of its parietes in the large arteries which come off from the arch of the aorta, as well as in the jugular veins or epigastric region. By *the application of the hand—palpation*—the force or impulse of pulsation is determined, the frequency or slowness of the heart's action is judged of, and the regularity or irregularity of its movements. We may likewise appreciate by this means any *tremors* or *frictions* in the pericardium which accompany its action. To determine the impulse of the heart, the hand must be placed directly upon the surface of the chest; but *mediate* palpation may be used by placing one end of the stethoscope over the part where the impulse is, when the extent to which the instrument is elevated, and the force with which this is accomplished, will give a more visible demonstration of the strength of the heart's impulse, especially in hypertrophy, or in hypertrophy with dilatation of the ventricles. In healthy persons with well-formed chests the impulse of the heart is so slight as not to be perceptible to the individual himself; and it is felt only at one spot—namely, between the cartilages of the fifth and sixth ribs on the left side—*i. e.*, from one to two inches below the nipple, and to its sternal side. When the parietes of the chest are much loaded with fat, the impulse is scarcely perceptible to the hand; while in thin persons it is evident to the eye. The impulse is somewhat stronger in the erect than in the recumbent posture. A forced inspiration diminishes it, and causes it to be felt lower down than usual; while a deep inspiration elevates the ribs, without raising the heart in the same degree. In a forced expiration the impulse is more perceptible, and is felt higher up. In examining the heart it is therefore necessary to make the patient vary his position, and to examine the heart both during inspiration and expiration. Calmness and tranquillity on the part of the patient must be obtained, because mental excitement, as well as exercise or exertion, increases the impulse of the heart. A diminished impulse, circumscribed or feeble, is due to feebleness of the action of the heart from disease or alteration of its muscular tissue—as in softening or fatty degeneration of its tissue, or general debility of the system; or owing to disease in the lungs or pericardium—as from effusion into the sac—when the apex of the organ may be prevented from coming in contact with the parietes of the chest. The impulse is also diminished in cases of attenuation of the walls of the ventricles, with dilatation of their cavity. Emphysematous lungs may likewise overlap the heart, and prevent its impulse from being felt. Increased impulse of the heart is generally due to some morbid state of the heart itself. It is stronger than natural in hypertrophy of the walls of the left ventricle, and is greatest in hypertrophy with dilatation of the ventricles. In such cases the impulse is slow, gradual, heaving, double, and occasionally so violent as to shake the bed on which the patient rests. This slow, progressive heaving impulse is produced by no other cause than hypertrophy with dilatation of the ventricles of the heart; and in such cases the extent of surface over which the impulse is felt is much increased, and the whole side of the chest is sometimes elevated by the action of the organ. The double impulse, which can be felt, is due to the fact that the *diastole* as well as the *systole* of the ventricles is accompanied by an appreciable impulse. Adhesions of the pericardium to the pleuræ of opposite sides may so bind down an enormously large heart that its impulse may not be felt.

The situation of the impulse of the heart may be altered by displacement of the heart itself, as in cases of empyema—towards the left side when the right pleural cavity is distended with fluid, and to the right side when the left pleural cavity is distended with fluid; and the impulse may then be felt on the right of the sternum. The heart may be pushed upwards, and its impulse felt on a plane higher than natural: as in cases of ascites, of ovarian and other abdominal tumors, hysterical tympanitis, or in advanced stages of pregnancy. In emphysema of both lungs the heart is displaced downwards, so that the impulse is then felt sometimes as low down as the epigastric region. When fluid is effused into the pericardium, the site of the impulse is somewhat elevated; and as the amount of fluid increases, the impulse becomes weaker, unequal, undulatory, or irregular; and when the effusion is very considerable, the impulse will be altogether absent. In *hypertrophy of the left ventricle*, with dilatation of its cavity, the impulse is felt lower down than natural, more to the left side, and occasionally on a line vertically from the axilla. In *hypertrophy with dilatation of the right ventricle*, the impulse is felt lower down, and more to the right side than natural, and not unfrequently on a line with the xyphoid cartilage. In the former case (hypertrophy with dilatation of the *left* ventricle) the impulse is progressive, heaving, and strong, elevating the hand or stethoscope of the observer, and felt over a very much larger surface than natural; in the latter case (hypertrophy with dilatation of the *right* ventricle) the impulse is felt over a more circumscribed space, and is neither heaving, prolonged, nor very strong. But the downward displacement of the heart is not due *only* to the hypertrophy. Three causes conspire to produce it: one is the hypertrophy of the organ; another is the dyspnœal inflation of the lungs; and another is the flattening of the diaphragm, which always exists where there is an abiding source of dyspnœa. This descent and flattening of the diaphragm is due to the instinctive efforts made in all forms of dyspnœa to obtain more air. The large heart is thus pushed downwards by the dyspnœal lung inflation, and pulled downwards by the diaphragm.

Turgescence and pulsations in the jugular veins are to be appreciated by inspection and palpation. They are signs which accompany advanced stages of some cardiac diseases. Turgescence is the most common, and occurs in cases in which an impediment exists to the free passage of the blood through the right side of the heart; and in such cases, when the tricuspid valve imperfectly closes the right auriculo-ventricular orifice, and so permits regurgitation into the auricle at each systole of the right ventricle, we have pulsation of the jugular veins as well as turgescence. Pulsation is always most evident immediately above the clavicles, and may extend half-way up the neck. When the *mitral valve* permits regurgitation, a "purring tremor" may be felt when the hand is placed over the region of the *mitral valve;* and a similar tremor may be felt over a dilated aorta when the valves are patent, or when a communication exists between a vein and an artery. The jarring pulse in the radial artery, in cases of aortic valve patency, is an instance of the "purring tremor" felt in an artery of small calibre.

Percussion.—The whole of that portion of the anterior wall of the chest behind which the heart is situated is sometimes called the *præcordial region;* but *anatomically* it is a region more limited, corresponding to that part of the pericardium uncovered by lungs. The portion of heart uncovered by lung seldom exceeds *two inches* in any direction. It has a triangular shape, the base below, the apex above. It consists of a portion of the apex of the right ventricle, and of part of the left ventricle near its apex, and is on a plane below the nipple and the *fourth* rib. Its base is on a line with the cartilage of the sixth rib. Its apex is at the point where the margins of the opposite lung begin to separate from one another—*i. e.*, immediately below the *fourth* rib. The triangular boundaries of this anatomically true *præcordial space* are constituted—(1.) On the right side of the thin edge of the right lung, by nearly a vertical line through the centre of the sternum; (2.) on the left side of the thin margin of the left lung, by a more or less oblique line through the cartilages of the *fifth* and *sixth* left ribs; (3.) below it is bounded by the diaphragm. Over this region, *to slight percussion* a sound less dull than that yielded by the liver is elicited, and *on stronger percussion* a difference of sound can be detected where the thin margin of the lungs covers the heart. The mode of percussing this region, so as to mark the lung part and the heart part, is to lay one finger over the decidedly dull part, and another over the slightly resonant edge of the lung, when, by striking the two fingers alternately, the arched line along which the organ lies in contact with the walls of the chest may be traced with accuracy, unless fat obscures the resonance. Another means of estimating the size of the heart is by *auscultatory percussion*. This requires two competent persons to determine the result, and is managed as follows: —"A solid cedar cylinder, six inches in length and one inch in diameter, cut in the direction of the fibres, and with an ear-piece attached, is applied to the centre of the *præcordial* region, while the ear is applied to the other end: percussion is then made by another person from the point near where the cylinder is applied towards the limits of the heart in every direction. So long as percussion is made over the body of the heart, a distinct sharp shock is felt directly in the ear; but as soon as the limits of the heart are passed, this sharp shock immediately ceases, even in passing from one solid organ to another in contact with it, as from the heart to the liver." Practice will enable a discrimination to be made between the characteristic sound of the heart and the diffused shock produced by striking the ribs. Generally the region of this *deep-seated dulness* extends transversely from the left nipple to a little to the right of the sternum, and vertically from the third to the sixth ribs. The true anatomical *præcordial space* may be *diminished* if the lungs are largely developed, and may disappear if the anterior margins of the lungs are emphysematous, so that their edges meet in front of the organ. The region of the heart's superficial dulness is *increased* whenever the heart is enlarged, or whenever fluid to any amount is effused into the sac of the pericardium. If the walls of the ventricles are hypertrophied, or if their cavities are dilated, the dulness will extend over a wider surface, and its extent is in some degree a measure of the increased size which the organ has attained. The enlarged heart pushes aside the lungs, and a larger portion of it comes in contact with the parietes of the chest. In hypertrophy with dilatation the heart attains the largest size that it is capable of, and the præcordial region may yield a dull sound over a square surface of from two to six inches. When hypertrophy predominates over dilatation, the space which yields a dull sound is wider from above downwards. When dilatation predominates over hypertrophy, the region in which a dull sound is yielded is wider transversely. When there is fluid in the pericardium, a larger surface than natural in the *præcordial* region yields a dull sound; the degree of dulness is more pronounced, and the sensation of resistance considerably greater than in the former case. The situation of the dulness, its amount and degree, are the guides as to its probable cause. When it is caused by enlargement of the heart, the site of the dulness is lower down and more to the left side than when it depends upon liquid effused into the pericardium. If a large amount of fluid is contained in this sac, a dull sound may be elicited by percussion as high as the articulation of the second rib with the sternum, and even in some cases as high as the first rib. The degree of dulness over fluid is also much more marked than over the heart itself, and the resistance to the finger is greater. Solidification of lung in the immediate vicinity of the heart will cause an apparent extension of the cardiac dulness.

Auscultation of the sounds associated with the action of the heart, like percussion, may be either mediate or immediate, but generally there are many objections to immediate auscultation; and in cases of valvular disease of the heart the use of the stethoscope—especially the double stethoscope—is absolutely necessary in many cases.

Sounds of the Heart (*a.*) *in Health.*—The phenomena of the heart's action, as observed by the eye on the heart of a living animal exposed to view, or as appreciated by the ear and hand applied over the cardiac region of man, are of the most definite nature; and in determining the alterations of sound produced by disease, it is necessary to bear in mind the occurrence and sequence of the following incidents:—The two auricles of the heart contract at the same instant of time, and the contractions of the right and left ventricles are also simultaneous. The contraction of the ventricles follows immediately that of the auricles. The relaxation of the fibres of each part of the heart follows immediately their contraction, and a short but distinctly appreciable period of repose intervenes between the relaxation of the ventricles and the secondary contraction of the auricles. Each complete revolution of the heart is thus accompanied by two successive sounds, separated from each other by intervals of silence. These two sounds *are unlike*, and the two periods of silence *differ in duration.* Within the limits of health these sounds have a variable duration, and limit of surface over which they are heard, as well as of intensity, and of a certain *rhythm.* The *rhythm* of the heart is maintained when its two sounds succeed each other, and are followed by an interval of repose, which varies in length according to the duration of the previous systole, and according to the rapidity with which the sounds succeed each other. **The First Sound** is coincident with the systole of the ventricles, the impulse of the apex against the side of the chest, and the pulse of the large arteries. It is sometimes also called the *systolic* or *inferior* sound of the heart. It should be listened to over the apex of the heart. **The Second Sound** is synchronous with the diastole of the ventricles, the recedence of the heart from the side, and the pulseless state of the large arteries. It is sometimes also called the *diastolic* or *superior* sound. It should be listened to at *mid sternum*, near its left edge, and on the level of the second interspace. A very short period of silence (which only becomes obvious when the pulse does not exceed sixty in a minute) succeeds the first sound; but a distinctly appreciable period of silence and repose, of some duration, succeeds the second sound. The *first sound* is of a prolonged and dull character compared with the *second sound*, which is more quick, short, and clear, and bears a close resemblance to that produced by *lightly tapping, near the ear, the knuckle of a bent finger with the soft extremity of a finger of the other hand.* **The Line of Transmission** of these sounds respectively it is of the greatest practical importance to observe; because, being so constant in health, any variation indicates some modifying cause. The *first sound* passes slantingly upwards to the left acromial angle, growing weaker and weaker on the way. Its intensity diminishes much more on the way to, and at, the right acromial angle. The propagation backwards of the first sound is thus clearest and fullest to the left—so that, while audible at the left back, it may be inaudible at the right. The *second sound* has the region of the base for its centre; and in nine people out of ten is heard more clearly at mid sternum, *on the level of the second interspace*, than at any point of the præcordial region. It radiates towards the right and left acromial angles, and with greater clearness to the left than the right, while posteriorly it is heard at the surface with less clearness and distinctness on the right side than on the left.

Next to the lines of propagation of the sounds being determined as above indicated, it is necessary to analyse the sounds and compare them —(1.) At both sides of the apex and region of the base; (2.) at base and apex on the same sides of the organ; (3.) at base and apex of opposite sides. In any one of these regions compared with the other, the sounds in health are found to vary so materially in positive and relative properties that any single description of them cannot be given.

The natural sounds of the heart thus indicated may be of abnormal character, as regards *intensity*, *pitch*, *duration*, *quality*, *rhythm*, *reduplication*, and *apparent distance*, at each of the following points:—namely, at the third interspace, and along the third rib for the distance of three inches from the left edge of the sternum, *for all sounds;* at the point where the apex beats, *for mitral sounds;* at the left of the sternum, and over the ensiform cartilage (if the apex be not in this position), *for tricuspid sounds;* at third left costal cartilage and adjoining part of the sternum, *for both aortic and pulmonary sounds;* at second right and second left costal cartilages, *for the sounds of aortic and pulmonary orifices respectively.*

It is important to observe the relationship of the sounds of the heart to the pulse. The first sound anticipates, by a very short but appreciable interval, the pulse at the wrist. An interval consistent with health is undetermined; but it may be stated generally, that if the diastole of the most distant arteries, such as the posterior tibial, behind the inner ankle, or the arteries on the dorsum of the foot, is so much retarded as to become synchronous with the *second sound*, the state indicates disease. It is a frequent attendant on insufficiency of the aortic valves.

When the sounds of the heart, after a certain number of perfectly regular beats, are suspended during the time usually taken to perform an entire revolution of the cardiac functions, the sounds of the heart are said to *intermit.* A sudden pause or silence then occurs, and such an intermission sometimes happens more or less regularly, or after a fixed number of regular beats. This constitutes *intermittence* or *intermission* of the heart's action. It may occur in individuals otherwise in perfect health; but it is common in diseased states of the valves or orifices of the heart, where some impediment exists to the direct passage of the blood, or where regurgitation is permitted.

(*b.*) *Morbid Sounds of the Heart, or Murmurs.*—The term "*murmur*" is applied to a sound superadded to the normal sound of the heart, which may occur with one or more of the natural sounds. These may be so obscured, or even obliterated, that the *murmur* or *morbid sound* is alone heard. According to their supposed seat of production these *murmurs* are—(1.) *Endocardiac*, sometimes called *valvular;* (2.) *pericardiac*, also called *exocardiac*. All endocardiac or valvular murmurs yield a "*blowing*," "*rough*," "*rasping*," "*sawing*," "*booming*," or "*bellows*" *sound*, as in the whispered expressions of the words "*who*" or "*awe*," the double letter "*ss*," or the single letter "*r*;" and there are certain spots where they may be heard in their greatest *maximum force;* namely,—(1.) A few lines above the left apex; (2.) just above the ensiform cartilage at mid sternum; (3.) on the level of the third interspace; and (4.) at the junction of the third left cartilage with the sternum. The physical causes which may explain the *mechanism* of these murmurs are due either—(1.) To pure constrictions of natural orifices; (2.) to pure widenings of natural orifices; (3.) to pure roughness of surfaces; or (4.) to the association of the latter condition with either of the two former. When murmurs are due to such single or combined mechanism, they are said to be *organic murmurs*, to distinguish them from *inorganic* murmurs due to certain morbid causes not yet well understood. These *inorganic* murmurs are connected—(1.) With certain states of the blood, as in spanæmia; or (2.) with dynamic or functional action of the heart itself. It is of the greatest importance to determine, therefore, the nature of a *murmur*, especially as to whether it is really *organic* or *functional*. In this investigation the essential points to be inquired into are as follow:—(1.) Observe the relationship of the murmur to the systole or diastole; that is, the *rhythm* of a murmur, or the position, in point of time, which it holds during the different physiological acts which constitute a complete cardiac pulsation—namely, the *contraction*, the *dilatation*, and the *period of rest* of each of the cavities; (2.) the spot of its maximum intensity on the surface of the chest; (3.) the direction in which the murmur is transmitted; (4.) its quality and pitch; (5.) state of the natural sounds of the heart which may remain; (6.) presence or absence of any audible phenomena in the arteries or veins, or both; and (lastly) the duration and clinical progress of the case. Each orifice of the heart may be the seat of two murmurs, *constrictive* and *regurgitant*, *with* or *against* the current; and thus *eight murmurs* are the total number the occurrence of which is possible. In determining *the attributes* of a cardiac murmur, the first step in the inquiry is to determine which is the *second* sound of the heart, and which is the *first*. In the *rhythmical* succession of the heart's actions the phenomena which we can appreciate externally are a little later than the commencement of the heart's action. *Before there is either sound or impulse the contraction has already taken place;* and whatever the pathological origin or seat of the murmur may be, those which immediately succeed the first sound and the impulse correspond to the period of ventricular contraction; and those which succeed the second sound correspond to the period of ventricular dilatation.

The murmurs of the heart to be distinguished are :—

1. An *auricular systolic* murmur, which *precedes and runs up to the* FIRST SOUND of the heart, produced in all probability in one or other of the auriculo-ventricular orifices, inasmuch as it coincides with the forcible emptying of the auricles into the ventricles through these orifices. Its reasonable interpretation, therefore, is *obstruction to the current of the blood* ENTERING *a ventricle.* If the left auriculo-ventricular orifice is affected, the murmur will be found to have the character of a *mitral murmur;* if the *tricuspid* orifice, its area will be triangular over that valve.

2. A ventricular systolic murmur *succeeds and runs off from the* FIRST SOUND; and it may be produced either in the *auriculo-ventricular* or in the arterial orifices. In either case it coincides with the *emptying* of the ventricles; and, therefore, if *auriculo-ventricular* in origin, it is a *murmur of regurgitation;* if, on the other hand, it is of *arterial origin*, it is a *murmur of obstruction.* A ventricular systolic murmur may thus have four distinct solutions. If the area be *mitral*, it is a *murmur of mitral regurgitation.* If the area be *aortic*, it is a *murmur of aortic obstruction.* If the area be *tricuspid*, it is a *murmur of tricuspid regurgitation.* If the area is that of the origin of the *pulmonary artery*, it is a *murmur which indicates pulmonic obstruction.*

3. A *ventricular diastolic murmur* succeeds and runs off from the second sound, and may be produced either in the *auriculo-ventricular*, or in the *arterial* orifices. In either case it coincides with the *filling* of the ventricles; and, therefore, if *auriculo-ventricular* in origin, it is a murmur of obstruction; and if *arterial*, it is a *murmur of regurgitation.*

A *ventricular diastolic murmur* may thus have four distinct solutions among organic valvular diseases. If its area is *mitral*, it is a *murmur of mitral obstruction;* if its area is *aortic*, it is a *murmur of aortic regurgitation;* if its area is *tricuspid*, it is a *murmur of tricuspid obstruction;* if its area is of the origin of the *pulmonary artery*, the *murmur denotes regurgitation from the pulmonary artery.* The most frequent combinations of these murmurs are those which denote—1. Combined aortic obstruction with regurgitation, indicated by ventricular systolic and ventricular diastolic murmurs. 2. Mitral obstruction and regurgitation, indicated by *auricular systolic* murmurs, sometimes by ventricular diastolic and ventricular systolic murmurs. 3. Various combinations of the two preceding forms, the aortic and mitral valves being both diseased. 4. Mitral obstruction with dilated right ventricle, and consequently tricuspid regurgitation, indicated by *auricular systolic murmur*, and ventricular systolic murmur. The rarest of all *murmurs* are those which denote *obstruction of pulmonary artery* and *tricuspid obstruction.* These murmurs are still more rarely observed singly, being usually in combination with diseases causing murmur on the left side of the heart.

An "accentuated cardiac second sound"—equivalent to an intensified or greatly pronounced sound—is heard in instances of aortic aneurism and aortic dilatation, associated with atheromatous degeneration, as well as in some cases of hypertrophy and dilatation of the left ventricle. In a case of aortic aneurism the second sound of the heart has been observed so intensified or accentuated over the base of the heart as at once to be recognised even by *tyros* in the art of auscultation. When this sound occurs, which is of a *booming* or *ringing* character, it is to be presumed that the aortic valves are competent. If they were insufficient, a diastolic murmur would be the result, as the prominent physical sign, and apt to cause the most skilful physicians to overlook the existence of aneurism.

Areas of Murmurs.—Modern diagnosis localises murmurs chiefly from the observation of the areas of transmitted sounds already indicated. There are four distinctive areas to which murmurs arising at these orifices may be propagated. 1. *Murmur connected with the Mitral Valve, Orifice, or neighbouring portion of the Left Ventricle*, may be the result of inefficiency of the valve, by changes in its structure, or from roughness of its edges, as by vegetations, shortening of the *chordæ tendiniæ*, or fibrinous coagula amongst them, causing obstruction. It may also result from simple roughness or deposit on the under surface of the valve without positive insufficiency. It is a *ventricular systolic murmur*, of maximum force, heard at and immediately above, or to the outside *of the left apex*, and which may completely or partially cover the first sound of the heart at the left apex, but which may also preserve its natural characters towards the base. The pulse is generally small, weak, irregular, *intermittent*, and *unequal*, especially this *systolic murmur* is faintly or wholly inaudible at the right apex, the mid sternal base, the pulmonary and aortic cartilages. It is more or less clearly audible about and within the inferior angle of the left scapula, and beside the dorsal vertebræ from the sixth to the ninth. This *murmur* is rarely of high pitch; and once established it is permanent. To find the area of this murmur it is requisite to determine the exact seat of the apex beat, the patient lying a little to the left side, or even on the face. If there is no distinct apex beat, find the most remote point downwards and leftwards at which the impulse of the heart is discernible; test this point by percussion, to observe if it corresponds with the margin of the cardiac dulness; test it also by auscultation, to hear if the *first sound* is conveyed thither with special distinctness. If a murmur concurs in position with the seat of these different phenomena, and if its seat of diffusion is *round this point nearly in a circle, it is probably of mitral origin.* 2. *Murmur associated with the Tricuspid Valve* may be due to regurgitation, or to the sharp collision of blood among thickened and roughened *chordæ tendiniæ.* It too is a *ventricular systolic murmur*, heard of maximum force *immediately above or at the ensiform* cartilage; inaudible, or nearly so, at the left apex, and very faintly, if at all perceptible, in the left vertebral groove opposite the lower angle of the scapula. It originates in the right ventricle; and when due to regurgitation, there is distension and pulsation of the auricle, vena cava, innominate and jugular veins, the distension of the latter being visible. It is generally a soft *murmur*, of low pitch, and rarely masks the systolic sound completely. It is a rare *murmur*, and often escapes detection from two causes—namely, a powerful mitral *murmur*, with which it is usually associated, or a deep-seated venous *hum.* The area of tricuspid valve murmurs is over the right ventricle, where it is uncovered by lung—*i.e.*, at the lower part of the sternum, and over the whole space between this and the seat of the mitral murmur. It is usually but little audible above the level of the *third* rib, and is thus distinguished both from the pulmonic, and still more from the aortic murmur. In cases of considerable hypertrophy and dilatation of the right side of the heart, especially in connection with emphysema (when the ventricle pulsates in the epigastrium), the murmur is heard loudest towards the xyphoid cartilage, and along the margin of the seventh left costal cartilage. 3. *Murmur connected with the Aortic Valve* habitually signifies a rough constriction of that orifice, and in rare cases has been traced to fibrinous coagula impeding the egress of the blood. It likewise is a *ventricular systolic murmur*, heard of maximum force at *mid sternum*, *opposite the third interspace, or upper part of the fourth rib.* It abruptly loses force between this point and the left apex, where it may be almost inaudible. Faintly perceptible at the second left cartilage, it is clearly audible at the second right cartilage, the notch of the sternum, and the left vertebral groove, opposite the second, third, and fourth dorsal vertebræ, thence rapidly losing strength downwards. It originates at the aortic orifice, and disappears about the sixth dorsal vertebra. It is propagated into the arteries of the neck. It is a high-pitched, harsh, loud, and prolonged *murmur.* The concurrence of ventricular hypertrophy increases its intensity and prolongs its duration the more contracted the orifice is. The area of this murmur corresponds generally to the regions of the sternum, and is often absolutely loudest close to the xyphoid cartilage. 4. *Murmur connected with the Orifice of the Pulmonary Artery* may indicate obstruction or simple roughness in its valves, or pressure on the vessel by adventitious masses in the pericardium. It is a *ventricular systolic murmur*, heard of maximum force at the *sternal edge of the third left cartilage*, or a little lower down, and imperceptible in the back. It is rarely met with. 5. *The Murmur indicative of Obstructive Narrowing of the Mitral Valve* is a *ventricular diastolic murmur* heard in maximum force *immediately above and about the left apex.* 6. *The Murmur which indicates the probability of Tricuspid Narrowing or Obstruction* is also a *ventricular diastolic murmur*, and is heard in maximum force at the *ensiform cartilage.* 7. *The Murmur which indicates Regurgitation at the Aortic Orifice* is likewise *ventricular diastolic*, and is heard of maximum force at mid sternum, opposite the third interspace or fourth cartilage; and it is often carried down loudly to the left apex. It is usually of an inspired blowing character, sometimes almost hissing, rarely rough, and completely fills up the interval of repose and silence which ought to follow the second sound. It differs from *constrictive* aortic murmur in being heard with almost as much intensity *about the ensiform cartilage as opposite the third interspace.* When it covers completely the second sound of the heart at the point of its maximum intensity, the valves may be presumed to be utterly incompetent. 8. *The Diastolic Murmur connected with insufficient Pulmonary Valves* is so rare that it is only mentioned here to complete the notice of cardiac murmurs which may be heard.

The relative frequency of intra-cardiac organic murmurs may be stated in the following order, commencing with the most common—namely, *mitral regurgitant; aortic constrictive; aortic regurgitant; mitral constrictive; tricuspid regurgitant; pulmonary constrictive; pulmonary regurgitant; tricuspid constrictive*,—all of which may be variously associated together.

The point at which a murmur is produced being in the majority of cases one of the four valvular orifices, all doubtful murmurs should be tested in the first instance on the supposition that they are valvular. With this view the most important practical points to be determined are,—(1.) The actual size and position of the heart, and the relation of its several parts to the thoracic walls; (2.) the anatomical *præcordial* space must especially be accurately defined; (3.) the exact point of the apex beat; (4.) the character of the impulse both of the right and left ventricle should be carefully studied; (5.) the exact seat and the limits of diffusion of the murmur actually under observation.

Pericardial Murmurs consist of *friction* or rubbing sounds, analogous to those already described in the pleura, and result from the movements of two opposed surfaces on each other, having been rendered dry or rough by change of tissue or exudation. Pericardial murmurs are almost limited to cases of inflammation of the pericardium. These friction murmurs are generally double, and are sometimes louder during the diastole than the systole of the ventricles. They appear to be superficial or near, and are seldom audible beyond the limits of the *præcordial* region. They never replace the ordinary sounds of the heart, and are entirely independent of them. Their duration is usually short, frequently ceasing entirely after having been heard for a few days, and not unfrequently changing their character and seat within the period that they are audible. A peculiar vibratory thrill, sensible to the hand laid upon the parietes, frequently accompanies them.

8. Significance of the Pulse in Cardiac Disease.—Certain forms of cardiac disease are capable of impressing peculiar and well-marked characters upon the pulse. The pulse ought to correspond with the ventricular systole, and with the first sound of the heart; and when the heart, the arterial system, and the blood are each in a normal condition, the force, the strength, the frequency, and the fulness of the radial pulse may be taken as a measure of the strength or feebleness of the systole of the left ventricle, of the rapidity with which the movements of the heart are performed, and of the amount of blood transmitted at each systole of the left ventricle. The beat of the pulse in the radial artery ought to be a little—a very little—later than the ventricular systole. The interval is almost imperceptible, unless the pulse is unusually slow. In the dorsum of the foot the interval is more easily appreciated. It is advisable to place one hand upon the præcordial region, or to auscultate the region of the heart, while the finger is on the radial pulse, to determine these points in all cases. *In softening of the heart* the pulse is sometimes much less frequent than the cardiac systole, because the impulse fails to be transmitted. *In hypertrophy of the left ventricle*, when the parietes are increased in thickness, the systole is strong in proportion, the blood is propelled into the aorta with increased force, and the radial pulse is strong and hard. Its velocity may not be increased, but the systole takes a longer time to be completed, and the pulse will "dwell longer under the finger." When dilatation is combined with hypertrophy, so long as the circulation continues free, the pulse will be full, or of larger volume, because the amount of blood propelled at each systole will be larger; but when dilatation is combined with attenuation, or if dilatation simply prevails, the radial pulse will have nearly opposite characters to those stated. It will be soft and weak. (See page 15, *ante.*)

The pulse in aortic regurgitation acquires a peculiar character. It is jerking and receding, though regular; while the pulsations of the arteries of the upper extremities and of the neck are visible, as if "leaping." It has been named a "locomotive" pulse by Bellingham and Todd—*i.e.*, the arterial tubes are SEEN to move by elongation—"leaping forth at each beat of the heart." This is sometimes termed the "pulse of unfilled arteries." In well-marked examples it appears as if the blood was divided into separate little balls, which pass in rapid succession under the finger. The sensation is better *seen* and felt in a large artery, such as the brachial, and two or more fingers should be laid on the line of artery. The arteries, when tortuous especially, appear like worms under the skin, wriggling into tortuous lines at each pulsation. This kind of pulse is also sometimes observed in *aneurism of the ascending or transverse portion of the arch of the aorta*, as well as in cases of *disease of the aorta* itself, when it has become rigid, elastic, and dilated. *Intermission of the pulse* indicates the slightest degree of derangement of the heart's action. It is not uncommon in persons advanced in life, in gouty subjects, and in derangement of the digestive organs with flatulence. It is also met with in cases of disease of the valves or of the muscular tissue of the heart. *An unequal pulse* is one in which some of the pulsations are strong and others weak. *An irregular pulse* is one in which a few rapid beats are succeeded by one or more slower beats, and when the interval between them is different. *Unequal and irregular pulsations* are much more unfavourable signs than a simply *intermittent pulse.* Each are met with in similar cases—in certain diseased states of the valves at the left side of the heart, or in morbid conditions of the muscular tissue. *In contraction of the left auriculo-ventricular orifice*, the pulse, in addition to being weak and intermittent, will become small, irregular, and unequal, although the heart's action continues to be strong. The heart may often beat so violently as to shake the patient in his bed, while the pulse is small, weak, and irregular. It appears as if there were two *pulses;* one is slow and deliberate for two or three beats, succeeded by three or four rapid and indistinct pulsations. *In mitral regurgitation*, when the closure of the valve is very imperfect, the pulse becomes weak and small, and will intermit if the circulation is hurried; and when a considerable quantity of blood is permitted to regurgitate into the auricle, the pulse will also become irregular and unequal. *In contraction of the aortic orifice* (when it becomes extreme only) the pulse becomes small and intermittent or irregular, resembling the pulse of considerable constriction of the mitral orifice. When the contraction is slight, it is neither weaker nor smaller than natural, and is perfectly regular. *In degeneration of the muscular tissue* the pulse in the advanced stages is small, weak, irregular, and unequal, sometimes slow, and the impulse of the systoles fails to be propelled. *In pericarditis with copious liquid effusion*, the pulse presents somewhat similar characters. *During the formation of fibrinous concretions within the cavities* of the heart the pulse suddenly becomes small, weak, intermittent, and irregular.

9. **Use of the Sphygmograph.**—In the conventional routine of "*feeling the pulse*," the unaided sense of touch is quite unable to distinguish many of the finer features which the *sphygmograph* enables us to appreciate; and a study of its practical application cannot be dispensed with by the student. It cannot take the place of "*feeling the pulse*," but its use not only extends the practical knowledge we derive from this ancient method of observation, but defines and greatly extends our knowledge of the more delicate characteristics of the pulse which the sense of touch fails to discover. To "*feel the pulse*" and to "*look at the tongue*," all patients consider as most essential duties on the part of the physician; and the sphygmograph does not aim at superseding either of these essentials. It aims at adding to our knowledge by writing down, as it were, for our inspection, the traces of hardness or softness of the pulse, thus measuring the *arterial tension*—that is to say, the greater or less *pressure of the blood within the blood-vessels*. The value of the instrument at present mainly rests on the exactitude and precision which it gives to our notions regarding " the *practical significance of various forms of pulse*"—a kind of knowledge only acquired by great and long practical experience, and a kind of knowledge very difficult, if not impossible, to convey in a text-book. (See page 16, *ante*.)

The sphygmograph gives an exact representation of the pulse-form—the frequency of the pulsations, and their regularity. It enables us to see at a glance any peculiarity in the entire series of pulsations, or in any single pulsation. A pulse-trace is composed of a series of curves, each corresponding to a complete revolution of the heart, and called a *pulsation*. For purposes of description the pulse-curve, which corresponds with each pulsation of the radial artery, may be divided into three parts—the line of ascent, the summit, and the line of descent. It is important, however, to regard the pulse-curve as consisting of a systolic and a diastolic part, coinciding with the two periods of each cardiac revolution. In examining a pulse-trace, one should note, in addition to the form of each pulsation, whether the summits of all of them can be joined by a straight line, and whether the bases can be also connected by a similar line parallel to the former. In some instances this ceases to be the case; the pulsations become irregular, and the line to join their summits or bases ceases to be horizontal. The line joining the summits of a series of pulsations is the line of the maxima of *arterial tension*. Its value as an indication is not absolute; it only tells us the variations that the arterial tension may undergo during the period of the observation; and it enables us to judge of the relative pressure within the vessels during any of the cardiac contractions registered. This line of greatest tension is of much value, and, with the corresponding line of least tension, should be observed in all cases, as these lines generally undergo parallel deviations, and a glance at either usually suffices to inform us of any change. Although particular febrile diseases cannot be thus recognised, changes in the pulse-curve are influenced by temperature variations in the patient.

10. General Symptoms of Thoracic Disease.—The general symptoms which express derangement of the *pulmonary organs* and their functions are—*dyspnœa*, *apnœa*, *cough*, *expectoration*, *hymoptysis*, *tenderness*, and *pain*. The general symptoms which indicate derangement of the *cardiac apparatus* are—*palpitations*, *sinking*, and *fainting*, combined sometimes also with *dyspnœa*, *cough*, *pain*, and *tenderness*.

The sensation of *dyspnœa* is brought about by an embarrassed or laborious breathing, amounting in severe cases to a sense of suffocation, expressed by the common English phrase, "*want of breath;*" or by the meaning conveyed by the Latin term "*anxietas*," when the dyspnœa is at the point of greatest intensity. It is aggravated by exertion, some positions of the body, and a full stomach. The act of speaking is frequently arrested "*to fetch a breath;*" and the patient who suffers from dyspnœa cannot hold the breath, or refrain from the attempt to inspire, as a person in health can. The dyspnœa may occur in paroxysms, and the acts of respiration may be painful. The number of respirations performed in a given time is greatly increased, and often unequally so, when the paroxysm is aggravated. In health, from eighteen to twenty acts of respiration are unconsciously completed in a minute, according as a person is lying, sitting, standing, or walking; and the ratio of the acts of respiration to the pulse varies in the proportion of one to four, or one to nearly six; that is, about one complete act of respiration for every *four* or *six* beats of the heart. But so intimately are the functions of the heart and lungs dependent upon each other, that any deviation from these proportions, in the acts of the one or other set of organs, immediately influences the actions of the other. The difference between the dyspnœa of asthma and that of cardiac disease is of importance to be recognised. *The dyspnœa of cardiac disease* is a breathlessness rather than a difficulty of breathing. It has a panting, gasping character. Oppression rather than tightness is complained of, with a strangling, choking feeling about the throat. The breathing is always accelerated; and the dyspnœa is most intolerant of movement, or of any exertion whatever—often the only condition in which it occurs. So long as rest is maintained, there may not be the slightest dyspnœa, but the moment any exertion is made the breath is gone. It is not less intolerant of the recumbent posture—hence *orthopnœa* or "upright breathing"—the patient being compelled to sit erect in order to breathe, so that in extreme cases he may not lie down for many days or nights; and should he fall into a dose, he is instantly awoke by a sense of impending suffocation, and is at once in a death-struggle for breath. . No suffering can compare with that of cardiac dyspnœa.

Cough, *expectoration*, and the nature of the *sputa*, furnish valuable indications of thoracic disease. *Microscopical elements of sputa* consist of—(1.) Young epithelium-cells—*i.e.*, of mucous corpuscles; (2.) mature epithelium, in the form of pavement, cylindrical, or ciliated bodies; (3.) cells containing granules, or bodies like cells made up of granules; (4.) pus-cells; (5.) coloured corpuscles of the blood; (6.) fibrine, either in the form of flake-like membranes, or in the form of casts of the smaller bronchi and pulmonary air cells, as in the expectoration of pneumonia. They are sometimes seen as dichotomous cylinders with rounded enlargements, composed of fine filaments, generally covered with granules. They may be met with from the third to the seventh day in pneumonia. (7.) Fat in granules or globules; (8.) tubercle matter, earthy, calcareous, amorphous, and crystalline particles; (9.) substances derived from the food; (10.) carbon and true pigment, free or contained in cells; (11.) fragments of pulmonary tissue.

The chemical characters of the sputa have not yet received the attention they deserve. Professor Laycock, of Edinburgh, had a chemical analysis made of very fetid expectoration in bronchitis, which demonstrated the existence in it of *butyric* and *acetic* acids. The odour was characteristic of the *butyrates of ethyl*, resembling the smell of may-flower or apple blossoms combined with an odour of fæces. Chemical investigation may thus demonstrate the cause of the excessive fetor in those cases which resemble gangrene of the lungs, if the smell alone is considered.

Sputa typical of Pneumonia are characterised by their viscidity, semi-transparency, and tenacity, adhering strongly to the vessel containing them. So tenacious are they, that the vessel may be turned upside down without the sputa becoming detached from the sides. These rusty-coloured sputa consist of mucus intimately mixed with blood—not streaked with it, as in bronchitis, but thoroughly mixed and amalgamated with it; so that they acquire a yellowish, or reddish-yellow, or even a red colour, according to the quantity of the blood. If the disease be not very intense, the expectoration never attains the degree of viscidity or the depth of colour above referred to; but though still tenacious and adherent to the sides of the vessel, moves from one part to another as the vessel is tilted. If the disease progresses to a favourable termination, the sputa become more abundant, less adhesive, and less highly coloured, passing through the various shades of orange, until at length they become greenish or whitish, and resemble the expectoration of ordinary catarrh. If the disease be hastening to a fatal termination, the expectoration becomes scanty, less tenacious, and of a darker or dullish-brown hue, resembling the juice of prunes. If the type of inflammation be typhoid, or adynamic, or connected with tubercles in the lungs, the mucus may be tinged, or even streaked with blood; or it may consist throughout of nearly colourless, stringy, and more or less frothy mucus.

Sputa typical of Gangrene of the Lung, at first of a muco-purulent character, sometimes tinged with blood, begin to emit a very disagreeable odour; and as soon as a free communication is established between the air-passages and the sloughing tissue of the lung, they not only acquire an intensely fetid gangrenous odour, but assume an appearance more or less characteristic of the disease. They lose their muco-purulent character, and become extremely liquid or sero-purulent, and of a dirty greenish or ash-grey colour. At the same time the breath acquires an offensive putrid odour, the pulse feeble and rapid, with evidence of great and increasing prostration.

Sputa typical of Acute Bronchitis appear, after a few days, as a thin, saltish, frothy mucus, sometimes streaked with blood. They increase in quantity, and soon become glairy, semi-transparent, and of a faintly yellowish colour. Subsequently they assume a greyish or greenish-yellow tint, and become opaque and viscid. If the attack is severe, they become muco-purulent, and in some instances may even lose their glairiness, presenting the character of thoroughly opaque mummillated sputa. In *chronic bronchitis* the sputa may be of the following characters:—either (1.) expectoration of a greyish, or greenish, or yellowish-white muco-purulent matter; or (2.) the expectoration being difficult, the sputa are comparatively scanty, consisting of stringy, tenacious mucus, of a greyish or yellowish-white colour, occasionally streaked with blood; (3.) expectoration being easy, the sputa are more copious, muco-purulent in character, of a yellowish-green colour, having a faint unpleasant odour; (4.) the sputa are profuse, almost wholly purulent, of a nauseous and sometimes a fetid odour, usually running together into one mass, but often remaining separated, and forming distinct mammillated masses; or (5.) profuse expectoration, sometimes to the extent of half a pint in an hour, of a thin, watery, ropy fluid, which varies in opacity, but is usually somewhat transparent, resembling gum-water.

Sputa typical of Plastic Bronchitis consist of ordinary bronchitic sputa, or blood-tinged mucus, with fragments of white fibrinous matter, or white fibrinous casts of the bronchi, which are ejected during violent paroxysms of cough. These concrete masses vary from mere fragments to large pieces of from *one* to *four* inches in length, and may be either tubular or solid, their ejection being preceded and often accompanied by spitting of fluid blood. They consist of concentric laminæ, formed at different periods in successive layers, of amorphous granular matter intermixed with mucus-corpuscles, compound granular cells, oil-globules, and ovoid cells containing dark colouring matter, such as exists in ordinary bronchial mucus.

Sputa typical of Acute Phthisis consist—(1.) Of frothy mucus, often speckled with blood; and when the tubercle softens, the sputa become muco-purulent or purulent; or (2.) the sputa may be scanty, consisting of little more than frothy mucus; (3.) expectoration, at first scanty, thin, colourless, and transparent, somewhat resembling saliva or gum-water, of a greyish colour, and more or less frothy. After a time the thin colourless sputa lose some of their transparency, and are seen to contain specs of opaque matter, which gradually subside and form a deposit resembling the sediment in barley-water; or they remain suspended by the more ropy part of the secretion, and float in the transparent mucous fluid in the form of striæ. Gradually becoming less aërated, they become more glairy and more tenacious, lose their pearly-grey colour, and are seen to be mixed with specks or streaks of an opaque white or buff colour, and not unfrequently with specks or streaks of blood. (4.) As the malady progresses, the characters of the sputa change again. They become opaque, of a whitish or yellowish hue, and are coughed up in more distinct and homogeneous masses. Sometimes they form rugged pellets of a yellowish-white colour, resembling boiled rice, which sink or partially float in a colourless, semi-transparent, ropy, non-aërated mucous fluid; or, accompanied by little mucous fluid, the sputa form large masses of a buff or yellowish-green colour, flocculent in appearance, but perfectly smooth in outline, which do not coalesce. but remain distinct and separate from each other if expectorated into a vessel of water. All these forms of sputa occasionally occur in *chronic bronchitis* as well as in *phthisis.* The ease or difficulty of the expectoration must be noted, and whether it is accompanied or not by pain. The quantity of the sputa ought to be measured in the day and night, the form of the masses spat up, their transparency or opacity, colour and viscidity, tenacity or adhesive property. The special characters of the sputa ought in every case to be closely observed, noting particularly its thin, serous, or frothy character; whether it contains any membranous or concrete exudation masses or blood; and it should be examined microscopically.

Expression of the Countenance in Thoracic Disease.—The countenance is often expressive of heart disease. In acute inflammatory affections of the lining or investing membrane, it acquires an anxious and depressed character. An elevation and depression of the *alæ nasi* or *nares* are commonly observed with the respiratory acts; and the occurrence, in children, of these phenomena indicates a greater amount of disease than the general symptoms would lead us to suspect. In chronic cases, when the circulation is impeded, the expression of the countenance becomes almost pathognomonic. The venous system becomes congested, the face becomes bloated and dusky, the eyelids puffed, the eyes staring, the conjunctivæ suffused, the lips and cheeks purple, respiration laborious. the air-passages loaded with mucus, and the jugular veins distended or pulsatile.

Cough.—The severity, the frequency, or paroxysmal nature of the cough must be ascertained; also the circumstances which excite it most; and whether it is attended with pain, or followed by expectoration or vomiting.

Pain.—The exact locality of pain in the chest should be ascertained. its severity, and the direction it tends to take. What particular circumstances aggravate it, and the effects of breathing, coughing, pressure, and postures should be determined.

Palpitation.—When *palpitation* occurs, its severity ought to be estimated by laying the hand over the region of the heart of the patient. It is desirable to ascertain its constancy; the circumstances which aggravate its existence or produce it—such as the influence of exertion going up a hill or upstairs, and the influence of mental emotion.

TABLE VI.—PROMINENT CHARACTERS OF PALPITATION.

PALPITATION DEPENDING UPON ORGANIC DISEASE OF THE HEART.	PALPITATION INDEPENDENT OF ORGANIC DISEASE OF THE HEART.
1. More common in the male than the female.	1. More common in the female than the male.
2. Palpitation usually comes on slowly and gradually.	2. Palpitation usually sets in suddenly.
3. Palpitation constant, though more marked at one period than at another.	3. Palpitation not constant, having perfect intermissions.
4. Impulse usually stronger than natural; sometimes remarkably increased, heaving, and prolonged; at others irregular and unequal.	4. Impulse neither heaving nor prolonged; often abrupt, knocking, and circumscribed, and accompanied by a fluttering sensation in the præcordial region or epigastrium.
5. Percussion elicits a dull sound over an increased surface, and the degree of dulness is greater than natural.	5. Extent of surface in the region of the heart, which yields naturally a dull sound on percussion not increased.
6. Palpitation often accompanied by the auscultatory signs of diseased valves.	6. Auscultatory signs of diseased valves absent; bruit de soufflet often present in the large arteries, and a continuous murmur in the veins.
7. Rhythm of the heart regular, irregular, or intermittent; its action not necessarily quickened.	7. Rhythm of heart usually regular, sometimes intermittent; its action generally more rapid than natural.
8. Palpitation often not much complained of by the patient, occasionally attended by severe pain, extending to the left shoulder and arm.	8. Palpitation often much complained of by the patient; readily induced by mental emotion; and frequently accompanied by pain in the left side.
9. Lips and cheeks often livid; countenance congested; anasarca of lower extremities common.	9. Lips and cheeks never livid; countenance often chlorotic; anasarca absent, except in extreme cases.
10. Palpitation increased by exercise, by stimulants, and tonics, &c.; relieved by rest, and frequently, also, by local or general bleeding, and an antiphlogistic regimen.	10. Palpitation increased by sedentary occupations; by local and general bleeding, &c.; relieved by moderate exercise, and by stimulants or tonics, particularly the preparations of iron.

SECTION III.—DISEASES OF THE HEART AND ITS MEMBRANES.

There are few complaints which more surely tend to shorten life, and none give rise to greater suffering and discomfort than diseases of the heart, pericardium, and great vessels. Alike in the young and in the old, they are the chief causes of sudden death, and if not suddenly fatal, "they lay their own hard conditions on the continuance of a man's life, and almost settle beforehand the manner of his death" (SIR THOMAS WATSON). These diseases are due mainly to lesions of—(*a.*) The *pericardium*; (*b.*) the *endocardium*; (*c.*) the *muscular structure* of the heart; and (*d.*) the blood-vessels.

(*a*.)—*Diseases of the Pericardium.*

PERICARDITIS.

Natural History.—The fibro-serous membrane containing the heart, and investing it on its external aspect, is liable to inflammation, sometimes diffused over a large extent of surface, tending to the effusion of a serous fluid, which becomes purulent—*suppurative* pericarditis. In the chronic forms of pericarditis, inflammation may express itself—(1.) By attacking the original membraniform exudation not yet removed; (2.) by thickening and pulpiness of the pericardium; (3.) by a thick, tough, universally unyielding envelope; (4.) by hæmorrhage; (5.) by purpura; (6.) by tuberculosis; (7.) by osseous concretions; (8.) by cysts from parasites and sacculated conditions of the pericardium, containing pus-like fluid—the remains of old pericarditis—so-called abscess of the pericardium. *The acute forms of pericarditis* generally involve the muscular walls of the heart to a greater or less extent.

The symptoms vary much as regards their expression, and in accordance with the co-existing malady with which pericarditis may be associated. In some instances they are most insidious in their approach: as when pericarditis follows upon *pleuritis* or *pneumonia*, *scrofula with tubercle* (*tubercular pericarditis*), *Bright's disease*, *chronic disease of the heart*, or *aortic aneurism;* and participation of the pericardium in the inflammation often remains undiscovered till revealed by *post-mortem* examination. In other cases the symptoms are violent and unmistakable from the commencement. *Rheumatic pericarditis* is generally attended with more violent symptoms than non-rheumatic pericarditis. The most marked characteristics are decided evidence of local trouble in the chest, especially pain more or less severe in the præcordial region ; and from this point it radiates over the whole of the sternum, extending even to the brachial plexus and down the left arm, accompanied by disturbance of the heart's action, a sensation of constriction over the whole chest, by urgent distress, and by an incapacity to take a long breath, or to cough. From these causes the patient is restless and anxious, and this anxious expression of the countenance is often peculiar and striking from the first. When acute pericarditis is not the result of rheumatism, the patient may suffer no pain, and the symptoms are often most obscure. The countenance is pallid, and there is an incapacity or unwillingness to lie on the left side. The pain in the region of the heart may be acute, severe, and shooting towards the shoulder, augmented by movement and increased by pressure upwards against the diaphragm. There may be febrile exacerbation, and the pulse, varying from 90 to 110, full and strong, is often intermittent, or otherwise irregular. Dyspnœa may exist in proportion to the distension of the sac with fluid, pressing on the lungs, and sometimes on the œsophagus, causing also dysphagia, pain in the cardiac region, palpitation, and subsequent greater dyspnœa as most common signs. This state of things having lasted from three to four days to a week, the patient may die suddenly. But all of these signs may be absent, and yet pericarditis may exist. The action of the heart may get feebler and feebler, weaker and weaker, the circulation becoming irregular. The pulse at the most may get intermittent, the veins of the neck prominent, the skin cold and pale; and, with œdema of the limbs, death may soon follow, with pericarditis—latent and unrecognized. When the pericardial effusion is great, it tends to impede, by its pressure, the action of the left lung; and hence the patient prefers in such a case to *lie on his* left side, so as to give more free play to the right lung; or he sits up, but bent forward in his bed. Pure idiopathic pericarditis is rarely witnessed, and very rarely occurs as a severe or clinically important form of disease. It is generally the accompaniment of some general or constitutional disease, especially *rheumatic fever*, *Bright's disease*, *scarlatina*, *small-pox*, *scurvy*, *pneumonia*, *pleurisy*, *peritonitis*, abscess in liver or mediastinum, *hydatid cysts*, *pyæmia*, *scrofula*, *cancer*.

The most characteristic *physical sign* is a double *frottement* or friction-sound, which closely resembles a rasping murmur. It has been named a "*to and fro*" sound. It is apt to disappear gradually from below upwards with the increase of effusion, and to return with its decrease; and it may disappear from the apex to the base with the progressive formation of firm adhesions. Usually limited to the region of the heart, it changes its character and its seat from day to day. It is sometimes remarkably modified by local bleeding, passing from a loud rough sound to a soft bellows murmur—most rough and intense during inspiration. The hand applied over the cardiac region will sometimes detect a rubbing sensation, which ceases with the cessation of pericarditis. But *friction-sound is not necessarily present in pericarditis.* It may be absent or present for long periods—its presence or its absence bearing no appreciable relation to the intensity of the disease. The amount of fluid effusion has much to do with this. A really considerable effusion of fluid at first muffles, then renders barely audible, and finally removes the sound, which becomes indistinct as the heart's sounds are also gradually extinguished. Like the heart's sounds, the friction-sound continues audible longest, and is recovered soonest towards the base. When the lymph is rapidly condensed into firm granulations, and the parts of those granulations most exposed to attrition have become polished and rubbed away, so that the points gradually receding from each other present fewer and fewer points of contact, then the friction-sound may subside, although no further effusion of fluid takes place. Again, *the presence of friction-sound is not necessarily a proof of the existence of pericarditis.* It is only when the murmur arises for the first time under observation, or when it accurately coincides with the development of symptoms, or where it corroborates and explains the symptoms, and the other physical signs already existing, in such a manner as to leave no doubt of its nature, that we are justified in assuming that a friction-murmur over the heart is pathognomonic of acute pericarditis. Increased extent of dulness in percussion, and marked prominence over the cardiac region, are also two characteristic signs of pericarditis.

A valuable distinctive sign of pericardial effusion when contrasted with pleuritic effusion, is, that when the left side is dull in front and resonant behind, it is a pericardial and not a pleuritic effusion. Any large increase of fluid at once betrays itself, especially in the young, by the protrusion of the left cartilages and ribs, the widening of their interspaces, prominence of the ensiform cartilage, and, in some extreme cases, by an epigastric fulness or even tumor. When the fluid increases, the pulse becomes feebler, and more disposed to falter and to flutter. It becomes irregular and excited; and often the patient is so fixed in one position that he fears to move, lest he may aggravate by exertion the dyspnœa and action of the heart from which he suffers so intensely. The jugular veins not unfrequently become distended, and this distension does not lessen during inspiration when the effusion is great. A significant sign is thus furnished of the greatness of the obstruction which exists to the thoracic circulation. Œdema and great coldness of the extremities are also apt to supervene with such a state of things. When, however, the products of inflammation become solid, and little serum remains, the pericardium, by the opposed serous surfaces, becomes attached to the heart throughout, and the pulse then resumes its force and regularity; and, if the patient survives, this adhesion remains for life. It is thus often an unsuspected source of chronic disease of the muscular substance of the heart, tending to asthenia, asthma, dropsy, and sudden death.

Treatment.—It is very doubtful if calomel ever does any good in pericarditis, notwithstanding that its use, so as to affect the gums, has been advised by physicians of the greatest experience and eminence. In all the *constitutional diseases* in which pericarditis occurs as a complication, mercury is certainly contra-indicated. In rheumatism and in Bright's disease, which furnish by far the larger number of cases of pericarditis, mercury is decidedly objectionable; and it is well known to be productive of most injurious consequences in Bright's disease.

In sthenic and acute cases blood may be drawn from the arm till some effect upon the pulse is produced; but preference is to be given to repeated relays of leeches over the præcordial region, or to free cupping. From *four* to *twenty* leeches applied to the left edge of the sternum, followed by fomentations, very commonly relieve or moderate the pain, and rapid improvement follows their use. To judge as to the repetition of leeching, the force of the heart must be observed, as indicated by the pulse at the wrist, by the actual strength of its impulse, and by the character especially of the first sound. If the impulse continues vigorous, and the first sound is undiminished, the further *local* abstraction of blood may be repeated; but if the impulse has manifestly declined in force, while the first sound is lessened, great caution is required in the further abstraction of blood. *Fomentations*, plain or medicated with *opium*, *friction* with *camphorated* and *ioduretted* liniments, and, in obstinate cases, the use of *blisters*, are the chief local remedies to be relied on besides leeches. In the second stage of the disease, when liquid effusion distends the pericardium, some reliance may be put in treatment by *a blister of a large size* over the præcordia and *diuretics*. *Digitalis* is a suitable remedy in cases where the beat of the heart is very frequent and insufficient, causing cyanotic and dropsical symptoms. Its effect is then very markedly beneficial. *Opium*, in doses of one grain (*i.e.*, stimulant doses), every third hour, shews its beneficial effects when it does not produce contraction of the pupil, nor headache, hot skin, furred tongue, nor constipation. Battley's solution is the most useful preparation; but the remedy must be watched closely. In the rheumatic form, *colchicum*, in the form of a draught, and the administration of *alkaline remedies*, are indicated by the constitutional state. *Warmth*, especially moist warmth, and *flying blisters* are the best agents to promote absorption of fluid.

Paracentesis is recommended in all those cases in which the effusion is so great as to cause alarming distress, orthopnœa, obstruction to the venous circulation, and serious interference with the heart's action. In such cases a fine exploring trochar and canula are to be gently introduced (not plunged), so as to make a valvular opening below the heart, either to the left of the xyphoid cartilage, or through the fifth intercostal space, close to its anterior extremity, and the fluid drawn off by means of a syringe. The result may be merely palliative; but even to afford the sufferer opportunity, after the operation, to pass the night in his bed (perhaps for the first time in a long period), and to enable him to sleep a little, is a great gain.

(*b.*)—*Diseases of the Endocardium.*

ENDOCARDITIS.

Natural History.—An inflammation of the lining serous membrane of the heart, covering the valves and lining the cavities of that organ, in the great majority of cases arises in the course of *acute articular rheumatism*, and all the more readily the greater the number of joints attacked. At the same time it is not improbable that an *idiopathic chronic* endocarditis is not uncommon. *Bright's disease* is next most frequently the cause of *endocarditis*, especially the acute form developed after scarlet fever. *Acute infectious disorders*, especially puerperal fever and measles, are also prone to be so complicated. In all such cases it seems not improbable that the irritant which sets up the inflammation, acting mainly on the tissue of the narrow passages through the heart—its orifices and valves—is the super-heated blood of the fever-patient, as marked by the intensity of the fever, besides other poisoned conditions of that fluid.

By a species of preference (the reasons for which are in a great measure speculative), the coverings of the narrow places, orifices, outlets, and valvular structures of the heart are by far the most frequent seat of lesion in the internal inflammation of that organ. The parts affected in endocarditis are also the parts on which the great tear and wear in the action of the heart is expended; and thus they are probably the first to suffer, owing to the mutual friction of the valvular edges upon each other.

Discomfort and uneasiness at the heart are most common symptoms, and more or less palpitation may be present. The impulse of the heart is almost always more extended and stronger than natural at the commencement of endocarditis, till infiltration of tissue takes place, when the pulse and force of the heart become small and soft. The heart's sounds undergo modifications as soon as the tissue of the valves become changed in texture, substance, and shape by the inflammation.

The murmurs which accompany purely acute endocarditis are in the order of their frequency:—(1.) Aortic obstructive; (2.) mitral regurgitant; (3.) aortic regurgitant; (4.) aortic obstructive and mitral regurgitant together. (The student is referred back to page 426, *et seq.*, for the account of the sites of maximum intensity where these murmurs may be listened to.)

When products of inflammation are apt to poison or spoil the blood, another class of symptoms and results are apt to be associated with endocarditis and valvular disease. Rigors, heat of skin, profuse perspiration recurring irregularly, dull, earthy-yellow discoloration of the skin (not of the conjunctivæ), diarrhœa, more or less bilious, pinched, anxious countenance, intense prostration, and muttering delirium announce this untoward occurrence. Secondary deposits in the lungs, the liver, or the brain are the records of its morbid anatomy.

Treatment.—What has been written relative to the treatment of *pericarditis* applies equally to acute *endocarditis;* but the management of cases in which the patients suffer from the valvular lesions and their immediate consequences demands the adoption of various lines of treatment, according to the causes or circumstances producing the disease.

When endocarditis seems lapsing into the chronic stage, the use of *iodide of potassium* and *liquor potassæ*, combined with bitter tonics, are generally useful.

(CHRONIC) VALVE-DISEASE.

Natural History.—The term "chronic valvular disease" is sometimes used in order to distinguish it from "chronic endocarditis." They are those lesions of the valves of the heart, or of its orifices, coming on for the most part insidiously, and which, persisting, induce obstruction or regurgitation, tending to hypertrophy and dilatation of the heart, with congestion of the pulmonary and systemic capillaries, œdema, anasarca, and dropsy. Valvular disease does not always owe its origin to endocarditis. It is often very insidiously established as a local expression of chronic Bright's disease, or chronic rheumatism, or gout, as well as in such forms of constitutional derangement of the system as are associated with imperfect nutrition of the body. The lesions to which valve disease may be referred are:—(a.) *Vegetations;* (b.) *fibroid thickening;* (c.) *atheromatous* and *calcareous degeneration;* (d.) *aneurism;* (e.) *laceration;* (f.) *simple dilatation of orifice;* (g.) *malformations.*

The exact lesion which causes the morbid state of the valves or orifices must generally, however, remain a matter of conjecture; and it is not of so much practical importance to determine the lesion, as it is to determine whether it is of such a nature as to cause obstruction to the flow of blood, or to permit of its regurgitation. One or other of these conditions is indicated by a persistent endocardial murmur, and the persistence of such murmur assuredly points to a condition which must lead to cardiac hypertrophy and dilatation. Nevertheless, disease at the various orifices operates very differently, the one from the other, in many particulars.

Aortic obstruction, one of the most common forms of valvular disease, has little effect in producing engorgement of the pulmonary capillaries, or general systemic congestion and dropsy; except when it induces dilatation of the left ventricle, and so causes the *mitral valve* to become so inefficient as to permit of regurgitation.

Mitral obstruction, although less common than mitral regurgitation, is recognised much more frequently than formerly. It necessarily induces dilatation of the left auricle; and, therefore, hypertrophy of this cavity and of the right ventricle more especially are the means of compensation, which, although it may defer for a long time systemic serous engorgement, cannot prevent a certain amount of pulmonary congestion. Hence severe cough, dyspnœa, attacks of cardiac asthma, and severe palpitations are common. Congestion, œdema of the lungs, and not unfrequently pulmonary apoplexy, are the ordinary modes of death. The pathognomonic indication of contraction of the mitral orifice is a "*presystolic*" or "*auricular systolic*" *murmur*, having the following characters:—Its *place in the cardiac rhythm* is "*pre*systolic." It is loudest over the apex of the heart, and confined to the region of the apex. It is inaudible or scarcely audible at the base, and is very rarely carried round the axilla to the back. If the stethoscope be placed over the third left costal cartilage the natural cardiac sounds are perceived (unless there be co-existing aortic disease). The "presystolic bruit" has a *rough*, *churning*, or "*grinding*" character, and is frequently accompanied by a markedly palpable thrill.

Aortic regurgitation, from incompetency of the sigmoid valves (one of the most common forms of chronic valvular disease), finds compensation in hypertrophy and dilatation of the left ventricle. The lesion is accompanied by a peculiar and very characteristic pulse-beat. The prolonged swell imparted to the blood at each systole is not sustained by the perfect closure of the valves. The waves of blood are short and abrupt; the pulse jerks and leaps, giving a sensation as if successive balls of blood were being shot suddenly under the finger—peculiarities which are consequences of the low arterial tension, caused by the regurgitation of blood into the ventricle during its diastole.

Mitral regurgitation is the most common of all forms of chronic valvular disease, and depends for compensation mainly on hypertrophy of the right ventricle. Hypertrophy of the left ventricle and dilatation of the left auricle also occur, leading to systolic auricular impulse at the second intercostal space, by admitting of the transmission of the impulse from the ventricle. When excessive, it causes a vibration, a thrill, or a purring tremor, perceptible on the chest-walls in the region of the heart, but which is not transmitted to any extent along the aorta or great vessels. When the regurgitation is combined with contraction of the auriculo-ventricular orifice, the left auricle usually becomes hypertrophied as well as dilated; and this additional lesion always diminishes the irregularity of the pulse characteristic of pure mitral regurgitation. *Mitral regurgitation* primarily interferes with the circulation through the lungs, producing cough, dyspnœa, and other symptoms of pulmonary congestion; and pulmonary apoplexy is common. The pulse is characteristic. It is irregular in rhythm, and unequal in force and fulness, resembling the undulating pulse of typhus fever.

Regurgitation through the tricuspid orifice, although rare as a primary disease, yet is not uncommon as a consequence of dilatation of the right ventricle, which then becomes hypertrophied, the right auricle dilated, the *venæ cavæ* distended, and there is a strong tendency to congestion of the systemic and cerebral capillary circulation.

The symptoms thus produced by valvular disease mainly depend on the impediment offered to the pulmonic and systemic capillary circulation. In the more advanced stages all forms of valvular mischief result in a certain amount of capillary engorgement; and therefore all forms of valvular disease have many symptoms in common. Oppression at the chest, breathlessness, speedy exhaustion on exertion, a general sense of lassitude, headache, restless and disturbed sleep, with frequent starting and frightful dreams, cough, palpitation, dropsy, occasional pain in the region of the heart, and sometimes severe *angina*, are amongst the earlier phenomena. *Cough* is due to pulmonary engorgement, and varies with the amount of *mitral* obstruction or regurgitation. *Dyspnœa*, while it is an early and constant symptom of mitral lesions, is, on the other hand, frequently absent in affections of the aortic valves until the later stages. On the other hand, headache, restlessness, disturbed sleep, and dropsy, are proportioned to the amount of systemic capillary congestion, and vary with the extent of tricuspid obstruction or regurgitation. Albuminuria is not an uncommon occurrence in the later stages. It is generally preceded by scanty urine, of a high colour, high specific gravity, and loaded with urates. *The dyspnœa* of cardiac disease is peculiar and characteristic, see page 435, *ante.*

The dropsy of cardiac disease makes its appearance late as *œdema* or *anasarca*, very partial and slight at first—a puffiness merely of the eyelids, or more frequently slight œdema of the ankles. By slow degrees it ascends towards the trunk, and ultimately involves the upper extremities and the face, the scrotum in men and the labia in females becoming enormously swollen. Towards the close, effusion is apt to occur into one or both pleuræ, but ascites is not common. The first appearance of the dropsy indicates that a new law takes effect in the circulation, and gains the mastery over the law of health, which has hitherto been able to retain the watery elements of the blood within the blood-vessels. Now the serum escapes from the blood-vessels, and accumulates in the areolar tissue of the body. The forms of valvular disease, in the order of the frequency in which dropsy is met with, are, —(1.) Considerable contraction of the left auriculo-ventricular orifice; (2.) dilatation of the right auriculo-ventricular orifice, with hypertrophy and dilatation of the right ventricle; (3.) a state of the mitral valve and orifice permitting free regurgitation; (4.) considerable contraction of the aortic orifice. As a general rule dropsy supervenes earlier, the earlier general venous congestion ensues. A varicose condition of the blood-vessels on the air-vesicles of the lungs is very soon established, which essentially aggravates the dyspnœa.

Treatment.—All the bad symptoms in valvular affections arise from defective compensation; and as the compensation in all cases depends on the integrity of the heart-muscle, the maintenance of its nutrition is the first great indication. *In affections of the aortic valves*, when the heart-muscle is well nourished, an almost perfect compensation may be maintained for years by a nutritious diet, with fluids in small quantity and tonics, especially preparations of iron. In the earlier stages a moderate and steady amount of exercise is beneficial. In *mitral* affections, on the other hand, the compensation can never be so complete as to do away with the tendency to pulmonary complications. In these cases, therefore, while the same nutritious diet and tonics are indicated to promote the nutrition of the cardiac muscle, exercise must be taken more cautiously; the object being to regulate and moderate the action of the heart, controlling the tendency to local congestion, and mitigating or removing the symptoms which result from the cardiac derangement. If the patient be plethoric, the heart's action tumultuous, and its impulse forcible, *cupping* between the shoulders may afford immediate relief to palpitation and oppression at the chest; but repeated or profuse *venesection* is calculated to excite irritability of the heart, to inpoverish the blood, and to induce dropsy. Repetitions of blood-letting ought therefore to be effected by the application of *leeches* to the *præcordial* region, and very general relief will be obtained by *hydragogue purgatives*, aided by *dry cupping*, *mustard poultices*, and *turpentine fomentations*. When, however, active congestion of the lungs exists, *venesection*, *cupping*, *blisters*, and *sinapisms* are required. When the heart's action is tumultuous and irregular, one of our most powerful remedies in mitral affections is *digitalis*. It slows the pulse and increases its tension, while strengthening and regulating the heart's action. When the aortic valves are incompetent, *digitalis* does harm by augmenting regurgitation. It should not be given when there is any evidence of fatty degeneration of the cardiac muscle. The best test of its beneficial action is the quantity of the urine. As long as the flow increases or keeps up to a maximum, which the digitalis has produced, the drug is acting beneficially. Sleeplessness being one of the most distressing symptoms, *opium* in some form might be considered advantageous; but "to give sedatives in such a case would be the refinement of cruelty" and dangerous to life. Careful regulation of the patient's mode of life is above all things necessary in chronic valvular disease. Excitement of all kinds must be avoided; and the diet should be light, nutritious, and of moderate quantity; the clothing warm, and cold should be carefully avoided, especially by those affected with mitral disease. When anasarca supervenes, the *hydragogue cathartics* are required to ensure copious watery discharges from the bowels. *Electuary* of *bitartrate of potash* and *compound jalap powder* in *syrup of ginger*, or *gamboge*, *elaterium*, *podophyllin* should be given on alternate days. Alcoholic stimulants also may be required, the most suitable being Hollands gin or whisky.

(c.)—Diseases of the Muscular Structure of the Heart.

MYOCARDITIS.

Natural History.—An inflammation of the muscular structure of the heart (extremely rare as an idiopathic disease), which becomes softened, flabby, and finally degenerates, occurs most frequently as a consequence of *acute rheumatism* or of *pyæmia*, associated with *endocarditis*, or *pericarditis*, or both; and its effects are especially obvious in the strata of fibres nearest the inflamed membranes. It is accompanied by *proliferation* of the connective tissue of the sarcolemma, and absorption of the primitive fasciculi, leading to cicatricial-like contraction of the affected parts. It is not to be diganosed during life, except as a matter of probability, in connection with *rheumatism*, tedious and malignant *scarlet fever*, *septicæmia*, *valvular disease*, *endocarditis*, *pyæmia*, *embolism*, or *syphilis*. Its existence under such circumstances is especially probable if rigors set in, with swelling of the spleen, vomiting, or pain in the region of the kidneys, and albumen or blood in the urine.

HYPERTROPHY.

Natural History.—The bulk or volume of the normal heart I have found to range from 12·5 cubic inches to 19·8 cubic inches, and an hypertrophic heart may weigh from 16 to 32 ounces, from abnormal growth of its muscular substance increasing its volume by thickening of the cardiac walls. The anatomical description of the condition known as hypertrophy is in reality a compromise between two opinions. By some it is regarded as a multiplication or increase in the number of the muscular fibres or primitive fasciculi—an *hyperplasia*. By others the condition is due to a thickening of existing fibres—an increase in bulk of the primitive muscular bundles—a true *hypertrophy*. Very rarely an idiopathic disease; for "spontaneous uncalled for hypertrophy" is less and less believed in—it is more commonly a secondary affection; and, in general terms, hypertrophy of the heart is always a compensating growth to overcome some obstacle. The hypertrophy may be general or partial—that is, may affect the whole heart or one side of the heart, or one ventricle or one auricle, or the ventricle of one side and the auricle of the other, or both ventricles or both auricles, or indeed every possible combination of the four cavities. The auricles, however, are much less frequently affected than the ventricles.

Two forms are recognised by the College of Physicians, namely:—(a.) *Of the left side;* (b.) *of the right side.*

In detecting enlargement of the heart and thickening of its walls, the size and force of the heart, ascertained by *palpation*, *percussion*, and *auscultation*, furnish the principal data (see page 415 *et seq.*, *ante*). It is by the extent and power of the impulse that the heart's muscular condition is ascertained; and so long as the muscular condition is sound, the valve disease has but little influence on health. As a rule, however, the persistence of valve disease implies an enlarged heart, with an impulse increased in extent and in power. But there are cases where a murmur exists with a preternaturally strong, troublesome, quick, and smart impulse, *but limited within a diminished cardiac region.* Such a murmur is of anæmic origin, and the heart is usually lessened rather than enlarged.

The *symptoms* of *hypertrophy* of the heart are local and general. The local symptoms are—a powerful impulsion, a wider range of action, and some change in the sounds of the heart. There is also a greater extent of dulness of sound in the cardiac region, and sometimes a bulging out of the left side. The increased impulsion is in proportion to the greater thickening of the walls. In slight cases it is only sensible to the hand, while in others the heart "knocks against the ribs," which not only often causes a vibration of the *præcordial* region, but even shakes the whole of the chest. The abnormal action of the heart in these cases is often also *visible*, each contraction agitating the patient's dress, and sometimes even moving the bed-clothes. The point of the heart deviates more to the left, and its motions may be traced from the second or third rib as low as the sixth or seventh intercostal space. The increased thickness of the walls of the heart is unfavourable to the transmission of sound; and in simple hypertrophy without enlargement of the cavity, the natural sounds will be duller than in the normal state; and if the hypertrophy be attended with smaller cavities, the natural sounds will be scarcely heard. When, however, the cavities are enlarged, the sounds are often clear, full, and even much louder than natural. In hypertrophy of the left ventricle the impulse is stronger immediately under the inferior portion of the sternum than between the fifth and sixth ribs. A sign of hypertrophy of the right ventricle is swelling of the jugular veins, which pulsate synchronously with the carotids. In general, this pulsation is limited to the inferior parts of the jugular veins, but in other instances it has been seen to extend to the superficial veins of the arm.

Dilatation of the heart implies that the capacity of its cavities is increased disproportionately to the thickness of their walls; and practically the physician has principally to deal with the diagnosis and treatment of—(1.) *Simple hypertrophy;* (2.) *hypertrophy with dilatation of one or more of the cavities;* and (3.) *simple dilatation with or without attenuation of the walls of the cavities.* Inefficient power of the heart's action may ensue and become obvious by the following conditions:—(1.) *Palpitation;* (2.) *irregularity of rhythm;* (3.) *persistent intermittence*, usually associated with an impaired first sound, defective apex-beat, and other signs of degeneration. Evidences of distress on the part of the heart are to be recognised—(1.) *By cardiac engorgement;* (2.) *palpation* conveying a feeling of diffused impulse; (3.) *percussion* shewing increased general dulness, frequently in the direction of the right side of the sternum; (4.) *auscultation* disclosing a short slapping sound, with or without irregularity, or, perhaps, evidence of laboriousness—a heavy swell with obvious effort, not followed by a corresponding effect—in filling the arterial vessels. A tickling cough, shortness of breath on exertion, slight attacks of bronchitis, pulse small and feeble, cardiac excitement, with irregular rhythm; such are the phenomena when dilatation predominates over hypertrophy. When *hypertrophy* of the left ventricle predominates over dilatation, there is visible pulsation of the carotids, a loud systolic sound in the larger arteries, and a full pulse, visible even in the smaller arteries; an abnormally strong heart-stroke, extending over the length of the heart; a depression of the apex, extension of cardiac dulness, intensification of the heart's sounds in the left ventricle and aorta, and sometimes a metallic click. When eccentric hypertrophy of the right side prevails, there is augmented heart-stroke, often extending along the sternum and left lobe of the liver; dislocation of the apex of the heart, which extends *outwards* rather than downwards; extension in width of the cardiac dulness, intensification of the cardiac sounds in the right ventricle and pulmonary artery.

Treatment.—The results of simple hypertrophy may, in the majority of cases, be greatly mitigated by such means as tend to tranquillise the action of the heart, such as occasional very moderate *cuppings* or *leeching* over the præcordial region. No known drug possesses the power of controlling the growth of the heart. *Saline* and *aloetic purgatives* aid the calmative influence of the local abstraction of blood. *Diuretics* are useful independently of the existence of dropsy. *Sedatives* of the heart's action are indicated throughout, such as *aconite*, *hydrocyanic acid*, *acetate of lead*, *digitalis*, and *belladonna*. *Aconite* is one of the best, in the form of the alcoholic extract, given in doses of *one-eighth of a grain.* In repeating the doses, the effects must be watched, while they relieve the painful sensations and disquietude about the heart. If anæmia prevails, *animal food* should be permitted; and the more soluble and less astringent preparations of *iron* should also be given. *Fluids* must be taken in small quantities; and *alcoholic fluids* of all kinds are to be entirely avoided. Months and even years of treatment may be required to produce any impression on the disease.

Like *hypertrophy*, *dilatation* of the heart is not removable by treatment, but judiciously-directed remedial measures may render the condition bearable, and even for a time unappreciated by the patient. To improve the tone of the muscle and strengthen the action of the heart, without exciting its irritability, are the objects to be aimed at in the management of the case. The influence of *digitalis* has recently been shewn as a most efficient agent in helping to co-ordinate, by restoring the regularity of the heart's movements; and is only of use when hypertrophy exceeds the limits of compensation. It slows the pulse and regulates the heart-muscle, but if the heart-muscle is unsound it will not be of service. (See p. 449, *ante.*) It is best given as an infusion, and continued as long as the quantity of urine increases or keeps up to the maximum which the digitalis produced. *Potash* or other *diuretics* may be conveniently added to vegetable infusions. *Digitalis* may also be given in pill, with the dried sulphate of *iron*, *carminatives*, *laxatives*, or both, twice a day. Half a grain to a grain of *powdered digitalis*, with an equal quantity of *sulphate of iron*, with a small portion (one-fourth of a grain) of *cayenne pepper*, in *extract of gentian* or *aloes* and *myrrh pill*, is a useful form, which may be continued for months. This pill should be taken shortly *after* food. The addition of *iron* to *digitalis* is of great value and importance. The diet should be nourishing without being exciting; and may include *animal food*, with *water* only, or *milk* and *lime water*, for drink.

When dropsy appears, *diuretics* yield most relief in the form of *acetate*, *nitrate*, *iodide*, and *bitartrate of potass. Nitric ether*, *compound tincture of iodine*, the *infusion* and *spirits of juniper*, or *gin*, may all be employed in successive changes, and variously combined. Occasional small doses of *blue pill* and *squill*, at bed-time, will facilitate their action generally; and so will *cupping* over the region of the kidneys, if symptoms of congestion of these organs prevail. *Hydragogue cathartics* also aid the *diuretics* in subduing the dropsical effusions, in the form of *elaterium*, *gamboge*, *bitartrate of potass*, and the *compound jalap powder* in electuary with *syrup of ginger.*

Fatty Degeneration of the Heart.

Natural History.—A change in the muscular substance of the heart, which results in the elements of the muscular fibres being replaced by molecular fatty particles. The change tends to sudden death by rupture of the heart or by syncope. At least two varieties of fatty disease of the heart have been recognised:—(*a.*) In the one form the fat, composed of oil in nucleated cells—the ordinary fat-cells—grows on the surface of the organ, between its muscular fasciculi and the reflected pericardium, especially at the junction of the auricles and ventricles, in the groove or sulcus between the chambers, along the trunk of the coronary veins, at the edges of the ventricles, at the apex and at the origin of the aorta and the pulmonary artery. The right ventricle is thus often almost entirely covered with fat, which so gradually encroaches on and insinuates itself between the muscular fibres, that it conceals, impoverishes, and ultimately causes them to waste from its pressure.

The muscular walls become thin, especially towards the apex and over the walls of the right ventricle. In these parts the fibrous structure almost disappears, and the *columnæ carneæ* appear to spring altogether from the *endo-pericardium.* In this form of fatty heart the muscular fibres may remain healthy, although they sometimes eventually degenerate. It usually accompanies general corpulence, and especially the obesity of advancing age, where much alcoholic aliment is taken. (*b.*) In the other form of fatty heart a degeneration of the fibre ensues. Its muscular element disappears, and its place is taken by fat in a molecular form, so that minute oil-globules ultimately come to fill the sheathes which previously contained muscular fibre. It is a fatty metamorphosis of the primitive fasciculi of the muscular substance. The greatest number of cases occur between 50 and 80 years of age.

Treatment.—Iron in its various forms, *quinine*, and *mineral acids* are the medicinal agents suggested. Freedom from anxiety, thorough repose of mind, entire avoidance of fatigue, gentle and regular exercise in the open air, careful attention to the state of the skin, a generous and stimulating diet at regular intervals, in moderate and equable amount at each meal, are the main hygienic indications calculated to impart tone to the system, improve the condition of the blood, and so induce a more healthy nutrition of the heart. A *salt-water sponge bath* should be used daily. In cases where digestion is sufficient, *cod-liver oil*, *cream*, and *milk* may be given with great advantage. The bowels should be so regulated as to render straining at stool unnecessary, as by *quinine*, *aloes*, and *hyoscyamus* in a pill at bed-time.

Angina Pectoris.

Natural History.—This disease implies pain or spasm of a weakened heart, referred to the lower part of the sternum, or to the præcordial region, extending through the chest to the left scapula, and up the sternum to the root of the neck. The pain is characterised by its suddenness, its severity, and by a sense of constriction or of burning. It compels the patient, if walking, instantly to stop, and almost prevents inspiration. The pain is felt likewise in the left shoulder, whence it sometimes reaches to the elbow, rarely to the hand, often with a sensation of numbness in the parts. A tendency to syncope exists, associated with intense anxiety, and a sensation of approaching dissolution. The immediate cause of the paroxysm appears to be a sudden impediment to the *coronary* circulation, and particularly to the return of the blood by the coronary veins—results due to a temporarily over-distended state of the chambers of the heart, and an inability in them to empty themselves, whether owing to weakness of the muscular parietes of the left ventricle or to other causes. The organic lesions of the heart most apt to be attended by *angina* are—conditions of the aortic valves which permit of free regurgitation, with a rigid dilated state of the ascending portion of the arch of the aorta, which permits the blood from the large vessels to regurgitate into it, combined with either of the following conditions of the left ventricle:—(1.) Dilatation of the cavity; (2.) attenuation of the parietes; (3.) softening or degeneration of the muscular tissue. Ascending a staircase or other acclivity, or indeed any active exertion, is a powerful exciting cause. In persons who have had previous attacks, the paroxysm is liable to supervene during sleep, as the result of a frightful dream disturbing the heart's action, or of considerable distension of the stomach by flatus impeding the movements of the heart. *Plethora* becomes a very common complication of *angina pectoris*, the very existence of which tends to produce it, if it did not previously exist—a sedentary life and abandonment of all active bodily exertion being almost inevitable consequences of the disease. *Angina pectoris* ought therefore to be regarded rather as a *symptom of organic disease of the heart* than as a distinct form of disease. What *dyspnœa* is to the lungs, *angina* appears to be to the heart. Its paroxysmal character, with intervals of immunity, also associates its pathology with disorder of the nervous system of the heart. The paroxysms generally supervene suddenly, and are characterised by a constrictive anxious pain, fixed most commonly on the left lower half of the sternum, and rarely extending above the fourth rib. Its duration depends on the persistence of the impediment to the coronary circulation. Sometimes the pain only lasts a few minutes, while at other times it will continue for two or three hours, a whole day, or even longer. The interval of respite from pain is likewise very uncertain—from a few hours to a few days, or a few months. Each repetition, however, increases the tendency of the paroxysm to return, and increases its violence; and at length, perhaps, an aggravated attack occurs which proves fatal.

Treatment.—The indications for treatment are to be found in a study of the lesions on which the paroxysms mainly depend. Medicine can do little more than mitigate the severity of an attack; and this is generally best done by diffusable stimulants, such as *brandy*, *ether*, *chloroform*, *ammonia*, *chlorodyne*. *Alcohol* in small doses (one drachm), *sesqui-carbonate of ammonia* in doses of *three* to *five* grains, the *muriate of ammonia* in doses of from *ten* to *twenty* grains, have each powerful stimulant effects. *Hot bottles* and *sinapisms* should be applied to the feet. The bowels may require to be rapidly and efficiently acted upon. The voluntary muscles ought to be set in motion to aid respiration, and prevent death by asphyxia. In that form of *angina pectoris*, where there is evident distension of the right ventricle, accompanied by palpitation, dyspnœa, and lividity of the face (*cardiac asthma*), the frequent use of *digitalis* seems to exercise a stimulating influence on the sympathetic cardiac ganglia and on the muscular fibres.

PALPITATION AND IRREGULARITY OF THE ACTION OF THE HEART.

Natural History.—The irregularities are of the following kind :—The heart may beat abnormally slow, may intermit, may have a rolling action, or its pulsations may be so frequent, and its action so irregular, as amounts to *palpitation.* The excessively slow pulse is often caused by some pressure made high up in the cervical portion of the spinal cord, or by congestion or pressure on the brain. The other states are as yet inexplicable, and may be considered as ultimate facts. The irregular and rolling action of the heart is in general accompanied with hypertrophy. Fits of palpitation, however, may occur in the most healthy subjects, and in the most healthy hearts, due to some abnormal innervation of the heart, by which its actions are rendered often highly irregular, and its pulsations remarkably increased in frequency. The excitability of the hearts of young people is readily accumulated and as readily exhausted. Every passion and every affection act powerfully on the heart's action, and changes its healthy beat; also every error in diet, or any over exertion, may produce the same effect. Every moral, as well as almost every physical cause, may consequently be the remote agent in producing palpitation, while every pathological state of the heart may be accompanied by it. As a primary disease, palpitation seldom occurs before puberty, but after that period it is common, and often to a most distressing degree in both sexes. The female suffers more than the male, and especially during amenorrhœa, or at the period of menstruation, and in more advanced life when menstruation ceases.

That palpitation is merely a disease of the function of the heart is evident from the number of young persons who suffer from it, and who afterwards attain a hale old age. Palpitation is, however, a common symptom of disease of the heart. Regarding palpitation as over-action of the heart, is apt to engender the belief that it indicates excess of power; on the contrary, the palpitating heart is more nearly allied to asthenia. It is evidently a laborious effort on the part of the heart, and indicates that it is over-taxed. It is generally intimately connected with more or less of ventricular engorgement; especially as a result of obstruction to circulation from diminution in the calibre of the arteries, as in Bright's disease, jaundice, and whenever poisoned blood is coursing through the vessels.

The attack of palpitation may be sudden, or only at night; or it may be preceded by acidity, flatulence, or other affection of the stomach. It has many degrees. In young persons of a delicate constitution it often occurs in a slight degree nightly; so that the patient, on going to bed, passes many hours sleeplessly, not only feeling his heart beat, but also hearing it. His subsequent sleep is unrefreshing, and he awakes in the morning more tired and jaded than when he went to bed.

Treatment.—During the paroxysm the patient should lie or be laid flat on his back, with his neck and chest bare, allowing the air to blow freely over him. The best medicinal restoratives are *camphor mixture* and *ether* ʒi., with some mild *opiate*, as the *syrup of poppies*, ʒi., or *tinct. hyoscyami*, ♏xx.; and this should be repeated every quarter or every half hour or hour, according to the severity of the attack, till the heart's action is relieved. *Cold brandy* and *water* is an excellent substitute for, or adjuvant to, these remedies. If the attack occurs shortly after a meal, some purgative medicine may be necessary to clear the bowels. Leeches to the *os uteri* in females, and to the verge of the anus in males, sometimes relieves palpitation—proceeding in the one case from uterine congestion or hysteria, or from varicose veins and hepatic congestion in the male.

Digitalis is useful in some cases of irregularity of the heart's action; such as—(*a.*) Palpitation and acute depression from *shock*, marked by a small feeble pulse, coldness of skin, cold breath, diminished temperature, and evidences of the organic system of nerves being acutely depressed. In such a case the heart's walls contract ineffectively. (*b.*) The irregular action of cardiac asthenia. (*c.*) Of palpitation in dilated heart.

It is important to counsel the patient strictly as to diet, for without such auxiliary assistance medicine is of little service in relieving palpitation. On questioning patients, it is constantly found that palpitation returns after tea or after breakfast, or whenever hot tea or hot coffee has been drank; and in these cases it is extremely desirable to wean the patient from all hot slops, and to induce him to drink cold water at his breakfast, and indeed at every meal. There are few tonics so beneficial as the natural tonic of cold water; and persons once accustomed to it feel a return to a modern breakfast as a punishment rather than a gratification.

SECTION IV.—DISEASES OF THE BLOOD-VESSELS.

(a.)—*Diseases of the Arteries.*

ARTERITIS AND ATHEROMA.

Natural History.—Inflammation of the textures of arteries is a disease by no means rare; and the results are grave and serious in proportion to the region where arterial inflammation occurs, especially in connection with the changes known by the name of *atheroma*, which are known to be "in continuity with *arteritis*," and to graduate from a condition in which no inflammatory results can be found into one in which inflammation is unmistakably present. *Chronic endarteritis* commences with relaxation and infiltration of the texture of the artery. The inflammation of the several tissues bear the same relation to the process as described in *pericarditis*, *myocarditis*, and *endocarditis*. A murmur is appreciable in aortitis—a loud, rough, systolic bruit—due to the passage of blood over the rugous and unpolished surface of the inner membrane. So long as aneurism does not occur, nor rupture or stoppage of one of the smaller vessels by the formation or arrest of a clot of fibrine, there may be few or no symptoms to indicate chronic inflammation. But if the results of chronic arteritis are extensive, especially in the form of *atheroma*, the demands upon the heart become increased, and cardiac hypertrophy may arise. If the inflammation spread from the arterial walls to the valves, insufficiency and stenosis may result. If insufficiency of the aortic valves occur, the hypertrophy, if existing, may not be maintained, from failure of or imperfect supply of blood through the coronary arteries, and so degeneration of the substance of the heart may result. Then follow all the usual symptoms of retarded circulation, with overloading of the venous system—cyanosis, dropsy, and suppression of urine. Evidence of disease in the peripheral arteries warrants the belief that *aortitis* may also be present in a more advanced stage of development. Rheumatism, gout, and syphilis are the most common causes.

ANEURISM OF THE AORTA.

Natural History.—A spontaneous circumscribed partial dilatation of some portion of the aorta, consequent on lesion or degeneration of some of its walls, most frequently arises from the ascending portions of the arch, and seems to spring most frequently from those parts of the vessel against which the current of the blood is most forcibly directed. The effects produced vary with the seat and the size of the tumor; and aneurism is generally one of the most distressing and puzzling of thoracic diseases. The *chronic endocarditis*, resulting in *atheroma*, as described in the previous page, is the local lesion which most frequently gives rise to aneurism, so that the morbid process which leads to aneurism is the same as that which leads to atheroma. Next in frequency is the simple fatty degeneration, without any preliminary thickening or cell-growth in the tunics. The most common local lesion which leads to aneurism is simple thinning of the aortic wall, not uncommon among elderly people. In consequence of some one or other of these changes, the aorta loses its elasticity, so that one part at last gradually yields, and becomes dilated by the pressure of the blood. Then, generally, on the occurrence of some sudden strain, the circular fibres of the arterial coat give way, leaving nothing but the outer and inner coat, the dilatation of which then goes on more rapidly. This event is sometimes recognised and remembered by patients as a sudden and violent muscular effort, such as lifting a heavy weight and the like.

The College of Physicians distinguish the following forms:—(*a.*) *Fusiform;* (*b.*) *saccular;* (*c.*) *diffuse,—i. e.*, where the sac is formed by the surrounding tissues. The size of aortic aneurisms varies from small walnuts—as within the pericardium, where they rarely attain any very great magnitude before giving way—to tumors of large size. Outside the pericardium they may attain considerable dimensions, pushing aside parts, and projecting in large tumors from the usual levels of the chest, destroying the sternum, ribs, and vertebræ by their constant and increasing pressure. The heart is usually hypertrophied.

Aneurisms opening upon mucous surfaces, especially upon the air-passages, are generally attended with small and irregularly repeated hæmorrhages. The persistence of these trifling amounts of blood in the expectoration justifies suspicion of aneurism, in the absence of any other circumstances to account for it. Tumors, such as are caused by aneurism, give rise to symptoms suggestive of laryngeal disease; therefore, in all cases, the larynx ought to be examined on the one hand by the laryngoscope, and on the other a physical examination of the chest should be made for the signs of an aneurism or tumor. The frightful and agonizing dyspnœa (of aneurism or tumor) is generally due to implication of the recurrent laryngeal nerve, and not to ulceration or disease of the larynx. Generally, it may be stated that the symptoms are the result —(1.) Of crowding together and compression of the organs within the thorax, caused by the growth of the aneurism; and (2.) of obstruction to the circulation. Aneurism of the arch, pressing on the trachea, generally causes the most intense dyspnœa, accompanied by a whistling sound on breathing and coughing. The dyspnœa becomes spasmodic, asthmatic, and laryngeal in paroxysms, if the pneumogastric or recurrent laryngeal be stretched or irritated. In some cases the dyspnœa may have a spasmodic asthmatic character, without any tendency to laryngeal spasm, associated with the persistence of small hæmorrhagic expectorations. In such cases the aneurismal tumor presses upon the bronchi towards the roots of the lungs, *evidence of valvular disease and of pneumonia being absent.* In another class of cases paroxysmal sufferings, in the form of *angina pectoris*, have their origin in the interference by an aneurism with the thoracic nerves, or with the venous circulation in the heart itself.

The correlation of the symptoms, as possibly indicating thoracic aneurism, is the main point for attention; and in addition to those noticed, raucous voice and aphonia are found sometimes associated with it. Undue pulsation, dyspnœa at intervals, oppression at the præcordial region, with difficulty of swallowing solid food, are, in combination, significant of aneurism.

Treatment.—Of all remedies *digitalis*, *aconite*, and *veratrin* are the most useful in tranquillising the action of the heart. They tend to regulate the circulation, without deranging the action of the stomach. The deposition of fibrine from the blood is more prone to take place when the circulation is "slowed;" indeed, it is the principle of treatment in the cure of aneurisms by pressure. The current of blood is not stopped, but is simply rendered more slow, so as to have an amount of stagnation of blood in the sac, favouring the separation of fibrine and its coagulation. A diminution of from *ten* to *fifteen* pulsations of the heart in the minute will thus greatly tend to the filling of the sac with coagula. Tufnel's treatment on this principle, "of slowing the circulation," consists of restricted diet and perfect rest in the horizontal position, for periods varying from eight to thirteen weeks, combined with the employment of such remedies as may be necessary for special ends. The horizontal posture must be *strictly and absolutely maintained*, in a light and cheerful airy room, into which the sun shines, and from which the patient may be able to have as cheerful a view as possible out of the window. The diet must be confined to *three* meals, served at regular intervals, and restricted to the following in kind and in amount:—*Breakfast*—Two ounces of white bread and butter, with two ounces of milk or cocoa. *Dinner*—Three ounces of broiled or boiled meat, with three ounces of potatoes or bread, and four ounces of water or light red wine.

Supper—Two ounces of bread and butter, and two ounces of milk or tea. These diets should make in the aggregate *ten ounces of solid and eight ounces of fluid in the twenty-four hours, and no more.* The object is to maintain life on as little food as possible, without inducing restlessness; but if such restlessness should occur, a little more food may now and then be necessary. *Anodynes*, *aperients*, *narcotics*, *sedatives*, and *tonics* are also useful aids. The patient must avoid everything which tends to increase the action of the heart. Moderate living, without the plethora of excess, but with sufficient nutrition to maintain the circulation at a *uniform* flow, is the point to aim at. Fatal results may speedily follow any marked change of diet and regimen. Pain and depression is to be subdued by the hypodermic injection of *morphia*, commencing with one-fourth of a grain. The heart's action may be regulated by *aconite* and *digitalis*.

(*b.*)—*Diseases of the Veins.*

PHLEBITIS.

Natural History.—Inflammation of a vein leads to changes in its texture, and to local coagulation of blood within the inflamed part of the vessel (thrombosis), and often also to the subsequent phenomena of venous or pulmonary or hepatic embolism. Veins are exceedingly slow to inflame. When they do, the inflammation-changes begin in the connective tissue, towards the outer parts of the vessel, even when irritant bodies are introduced into the cavity of the vein itself. The pus forms outside the vein, and thence the inflammation spreads by the connective tissue simply by continuity.

The varieties of *phlebitis* are, (a) *Adhesive;* (*b*) *suppurative.* The first set of phenomena, which accompany the early stage of inflammation of the coats of a vein, mostly concerns the physician,, in connection with the important and dangerous phenomena of *embolism.* "Coagulation of the blood in the living vessels"—the formation of a clot or "thrombus" (*thrombosis*)—are the phenomena which attend the formation of multiple abscesses in phlebitis. The impulsion or projection onwards of a coagulum-clot, or thrombus, or substances detached from the walls or valves of the vascular system, is known by the name of *embolism.* The coagula may travel in particles or larger masses from the veins to the heart, or from the heart to the arterial peripheric vessels. Thus mechanical *deposition* of morbid substances in various parts of the body, distant from the seat of phlebitis and of thrombus formation, is accounted for. All the cases fully recorded, which illustrate the phenomena of phlebitis, with pyæmia or multiply abscesses, as a result, have shewn that the affection essentially begins by a real coagulation of the blood at *some definite fixed point;* and this is the most obscure part, and the most difficult to discover, in the history of all cases of phlebitis or of pyæmia associated with phlebitis. But where this beginning is traceable, the history is exceedingly significant, as pointing to some sources of *local irritation*, which, by simple disturbance of the flow of blood, determines in some way its coagulation in the living vessels. The next set of phenomena characteristic of the phlebitis of pyæmia and the formation of multiple abscesses, are those connected with the softening, disintegration, and breaking up of the thrombi or clots. Clots in peripheral veins, however small, are the sources of great danger. As a rule, they may lead to secondary and multiple deposits and abscesses in the lungs; and it is chiefly differences in the size of the capillary vessels which determine their ultimate locality, where they act as any foreign body would. The debris of clots, and large cell-elements from clots, in the mesenteric veins, and from ulcers of intestines, passing through the liver capillaries and proceeding to the lungs, where they are arrested, illustrate this. The most common cases of *thrombosis* in veins are to be seen in bed-ridden dropsical persons, whose veins in connection with the buttocks, such as those of the thighs and genitals, contain *ante mortem* clots, probably acknowledging the source of the irritation giving rise to them, as the pressure of the weight of the body on the radicles of these veins, and of the gravitation of the blood against them.

PHLEGMASIA DOLENS.

Natural History.—Obstruction of the veins and lymphatics, causing a painful, non-œdematous, brawny swelling of one or of both lower extremities, and attended with great prostration, are the principal features of this disease. It has also been named "milk-leg" or "white-swelling." It is most common after parturition, especially when much blood has been lost in the process of childbirth; and it not unfrequently attends malignant uterine disease. The symptoms may set in immediately after labour, or at any time during the next five or six weeks. They are expressed by fever, headache, thirst, nausea, and pain, especially in the lower abdominal and pelvic regions, accompanied with great prostration. A chill or a rigor may usher in the disease, with or without pain or swelling of joints, and within twenty-four or thirty-four hours the swelling of one or both lower extremities may be apparent, commencing about the foot or lower part of the leg, from which it extends upwards. The acute stage lasts about fourteen to twenty-one days; and after recovery many deep veins remain obliterated, but compensated for by varicosity and enlargement of superficial ones; so that the limbs are useless for many weeks or months, and too often never recover their wonted power and shape.

Treatment.—The general health in such cases is generally feeble, and prostration exists; hence, *sedatives* and *alkaline fomentations*, *perfect rest*, *simple diet*, and *opiates* to relieve pain are required. The fluid in which the fomentation flannels are to be wrung out is made by adding one pound of *bicarbonate of soda* and one ounce of *extract of poppies* to one gallon of boiling water. These ought to be changed every thirty minutes, and applied over the whole limb, and over the groin and lower part of the abdomen, wherever there is tenderness. The heat and steam from these are to be retained by means of impermeable cloths. *Wine*, *brandy*, *milk*, *raw eggs*, *animal food*, *ammonia*, and *bark* are necessary. After the acute symptoms have subsided, there is no remedy so beneficial as *efficient bandaging*, together with the preparations of *iron*, *quinine*, and *tonic vegetable bitters*, like *calumba*, aided by change of air and residence.

SECTION V.—DISEASES OF THE DUCTLESS OR BLOOD-VASCULAR GLANDS.

Although the functions of the thyroid gland, spleen, and supra-renal capsules are not precisely determined, there is reason to believe that they are in some way connected with the elaboration and accommodation (as by *diverticula*) of the blood.

The functions of the supra-renal glands seem to be at the same time part of the sympathetic system, as well as sanguineous, in this respect—that the cortical and medullary portions are functionally different, the former pertaining to the vascular, and the latter to the nervous system. Hence the diseases of these organs are naturally considered here.

(*a.*)—*Diseases of the Thyroid.*

GOITRE.

Natural History.—An affection of the thyroid gland, the characters of which are different at different stages of its existence. At first the gland is soft, but it gradually acquires a firm and even a cartilaginous consistence. In the soft condition the cell elements secrete a fluid of a thick, ropy, viscid, gelatinous appearance (colloid);

but when the consistence increases, the hypertrophy of the cell-elements is generally more obvious than the fluid secretion, its blood-vessels are increased in size and number, and ultimately cysts become developed, in which the glairy fluid abounds. In the more advanced cases, osseous or at least calcareous deposits occur, and occasionally the whole organ is transformed into an osseous-like capsule, filled with matter of various kinds, which has been likened to jelly, suet, and honey. Sometimes the gland preserves its original lobulated form, its relative proportions being maintained; at other times there is no distinction of parts or lobules. The right lobe is more often enlarged than the left.

As the prevalence of the disease has appeared limited to certain districts, popular opinion has regarded the water used for drinking as being in some way connected with its cause. But there is a want of chemical analysis and evidence in support of the hypothesis that goitre is due to the hardness and impurity of water used as drink. Dr. J. B. Wilson, surgeon to H.M. British forces in India, has recently investigated the point. The districts are hilly where goitre prevails. The results of his chemical analysis of the water strengthen the belief that goitre is not owing to drinking hard water—that it is not connected with the composition of water at all. An excess of the disease occurs among those whose duties are most laborious, as in carrying heavy loads—working in a constrained position—beginning between the ages of ten and twenty, when active labour is first pursued. There is also a marked excess in frequency of pulse, and the subjects of goitre are always liable to palpitation of the heart. Like the exophthalmic variety, it is entirely a circulatory disease.

Treatment.—*Iodine* has acquired the reputation of being almost a specific in curing goitre, after removal from the high to lower districts; and whatever may be the preparation employed, its use must be persevered in for a length of time, and the dose gradually increased. The best form of administration is that in which the *iodine* is mixed with and dissolved by *iodide of potassium.* It is then held in solution, and is sometimes known as *Lugol's solution.* It is made by dissolving *one part of iodine* (five grains) with *two parts of iodide of potassium* (ten grains), and adding water (to the extent of *one pint*). It contains *one grain* of iodine in four ounces of the solution. The treatment ought not to commence with a larger dose than *one drachm* three times a day. Small unirritating or alterative doses are the most efficient, and they may be gradually increased when necessary. The remedy may also be employed externally in the form of a liniment or ointment—the *unguentum iodum* *compositum*, of which a small portion may be rubbed upon the swelling night and morning. In some parts of India the application of an ointment of the *biniodide of mercury* has been found very efficacious. It is prepared by adding finely-powdered *biniodide of mercury* to melted lard or mutton suet. This ointment is then applied to the goitre about an hour after sunrise; and is rubbed in, by means of an ivory spatula, for about ten minutes—*the patient sitting with his goitre held well up to the rays of the sun as long as he can bear the exposure.* It will probably produce a blistering effect, although no vesicles appear on the skin; and in the course of the day the ointment should be gently rubbed in again, and the patient sent home, with orders not to touch it with his hands, but to allow the ointment to be gradually absorbed. A second application is sometimes necessary in very bad cases.

EXOPHTHALMIC BRONCHOCELE.

Natural History.—Enlargement, with vascular turgescence of the thyroid gland, accompanied by protrusion of the eyeballs, anæmia, and palpitation, has received the name of *exophthalmic goitre*, the *goitre* of *anœmia* or *spanœmia*. It is rare in children; more common in females than males; and co-exists with wasting discharges, or supervenes upon them; such as leucorrhœa, menorrhagia in females, and hemorrhoids in males. It is sometimes associated with heart disease. The normal nutrition of the nerve-centres and digestion is obviously impaired. Sleep is disturbed and unrefreshing. Pallor and anæmia therefore ensue, with palpitation of the heart and carotid arteries. A systolic *bruit* may be heard over the region of the heart, and sometimes over the carotids; and during any excitement, a rushing or throbbing feeling is experienced in the head. The thyroid body seems to act as a diverticulum to the blood. Simple hyperæmia prevails in the gland, which subsequently becomes very large, partly from dilatation of its vessels, and partly from infiltration of the tissues with serum, or from simple hyperplasia. Sometimes cysts form with serous or colloid contents. Palsy of the vaso motor nerves connected with the carotids, thyroid gland, and heart, is one explanation given of the development of this disease. The exophthalmic state is similarly induced. Continued distension of the intra-orbital vessels, with growth of fat, presses the eyeballs forwards; and the protrusion may be reduced by pressure applied to the carotids. In fatal cases the eyes are observed to recede within the orbit after death. Vision is rarely impaired. Dilatation of the cavities of the heart is the lesion which is induced in that organ, and dilatation of the veins is the last expression of the disease. Palpitation is long continued, with frequent pulse (120 to 140), a whistling noise is heard over the region of the thyroid, and a peculiar sensation may be felt by the hand laid over the gland; otherwise the general symptoms are very irregular, and the disease generally drags on for months or years. The patient becomes cyanotic and dropsical, with dyspnœa. Death takes place more rarely by cerebral symptoms. As a rule, however, the disease ends in recovery.

Treatment.—The use of iron and tonics generally are indicated; and considering what has been already said under diseases of the heart, the use of *digitalis* is indicated in this disease in connection with the cardiac symptoms. The indications for treatment in *exophthalmic goitre* are, to allay the irritability of the stomach by the use of *ice;* to give bland, unstimulating, nutritious food in small quantities and at short intervals; to produce sound and refreshing sleep by *morphia*, or any such stimulating soporific; to administer digitalis; to steady the weak heart and control its excitement. *Iron* may improve the state of the blood; but the *hygienic* conditions in which the patient lives are mainly to be rectified. The use of *belladonna* in combination with *iron* is recommended.

(*b.*)—*Diseases of the Spleen.*

SPLENITIS.

Natural History.—Primary inflammation of the substance of the spleen is extremely rare in this country. It is common in the East Indies, especially in the low marshy districts of Bengal, and occurs in the paludal districts of other parts of the world. Hæmorrhagic infarctions, occurring during the course of fevers and general contagious diseases, are the most frequent causes of consecutive inflammation and suppuration of the spleen. The disease is seldom seen unless accompanied by ague; and the additional symptoms are tumefaction and some pain of the left side, followed by dropsy. The more common form of diseased spleen is *hypertrophy*, when it can almost always be detected by palpation or percussion, sometimes extending low down into the pelvic region, well over on the right side of the *linea alba*, and backwards almost to the spine. In these cases the patient complains of weight and uneasiness, rather than of soreness; his pulse is natural, but the countenance extremely sallow; his person greatly emaciated, his bowels irritable; and these symptoms are for the most part accompanied by œdema of the lower extremities, or by ascites. Hæmorrhage from the stomach and bowels, towards the close of the disease, is often so profuse that many pints of blood have been passed or thrown up, greatly exhausting the patient, and rapidly hastening his dissolution.

Treatment.—Iodide of potassium and the *bromide of potash* are of use. The marked influence of the *biniodide of mercury*, in the form of an ointment, rubbed into the skin over the surface of the spleen, in reducing its enlargement, is also well attested. (See page 465.)

LEUCOCYTHÆMIA.

Natural History.—In this disease the number of white corpuscles in the blood is greatly increased, with a simultaneous diminution of the red, brought about by chronic exhausting diseases, exposure to cold and wet, or serous acute affections—such as typhus fever, pneumonia, puerperal fever, affections of the lymphatic glands or of the spleen, and is attended sometimes by cough or diarrhœa, epistaxis, hæmorrhagic effusions, furunculous or pustulous eruptions.

The increase of the colourless corpuscles of the blood, which is the prominent character of this affection, does not seem in any case to have existed or occurred by itself. Other morbid states precede, co-exist, or succeed the augmentation of the colourless corpuscles, the most frequent of which is the enlargement of the spleen, an enlargement so constant that its existence, if not otherwise accounted for, would at once indicate that leucocythæmia prevailed, and would suggest a microscopic examination of the blood. The *liver* is also frequently enlarged, but not to so remarkable a degree as the spleen. Affections of the *lymphatic glands* also predominate in some cases, when the elements of the lymphatic glands prevail in the blood, which is then characterised by innumerable round granulated nuclei, generally provided with nucleoli, of the size of the usual nuclei of the lymphatic glands.

There are obvious indications of general ill-health; and the most prominent symptom has been tumefaction of the abdomen, depending upon an enlarged spleen and liver. Ascites and anasarca of the lower half of the body are not unfrequently present; and a tendency to œdema may commonly be observed, the general surface of the body being extremely pale. Transitory pains are frequently experienced in the abdomen. Intestinal disorders are also present, such as vomiting, constipation, or diarrhœa, and jaundice is not unfrequent; but diarrhœa is one of the most dangerous complications, and the most difficult to arrest or control. A considerable amount of dyspnœa may prevail, which cannot be accounted for by elevation of the diaphragm merely. Hæmorrhage often occurs in the form of epistaxis, or from the gums.

The disease generally runs a chronic course, and a high degree of emaciation accompanies it. Leucocythæmia is usually well established before it is noticed, and before any remarkable disturbances in the general health have occurred. It is not till towards the fatal termination that any fever sets in, which then assumes the hectic type.

Treatment.—The most varied remedies have been tried, without checking the increased formation of colourless corpuscles; but it is suggested that if it is possible to discover the glandular or splenic affection early, before the alteration of the blood has made much progress, it is probable that the disease may be averted. Tonics, nutrients, and stimulants are indicated, to support the system. The use of the nitro-muriatic bath ought not to be neglected.

PECULIAR ENLARGEMENT OF THE SPLEEN AND LYMPHATIC GLANDS—*Syn.*, HODGKIN'S DISEASE.*

Natural History.—This disease is characterised by a peculiar white deposit in the spleen, sometimes also in the liver, kidney, and lungs, and by an enormous enlargement of the lymphatic glands throughout the body, accompanied during life by a remarkable anæmia and disposition to anasarca.

Although this disease has not yet been recognised in the nomenclature of the College of Physicians, it seems to be an affection presenting as striking peculiarities as any in the Nosology, and therefore deserving of a distinct appellation and description. The subject has got into a false position, mainly in consequence of having been referred to in connection with lardaceous disease, with which it is not to be confounded. The enlargement of the glands appears to be a primitive affection of these bodies, the consequence of a general increase of every part of the gland, and pretty uniform throughout. In conjunction with this affection of the absorbent glands, the spleen shews enlargement of its gland elements. In malignancy the disease takes a place between cancer and tubercle, and death occurs through derangement of the glands.

General ill-health, paleness and sallowness of complexion precede any other signs. Lymphatic glands are subsequently found enlarged, as in the neck, axillæ, and groins. Weakness is felt, which increases; and the patient can no longer walk nor run up a stair. He totters in the legs from feebleness. Sexual appetite is lost, and flesh is lost; so that emaciation with marked anæmia exists—pale sclerotic and feeble pulse. The legs become œdematous.

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* A disease not recognised in the nomenclature of the College.

LARDACEOUS SPLEEN—*Syn.*, AMYLOID DISEASE, WAXY SPLEEN.

Natural History.—In this disease the texture of the spleen, and especially the Malpighian sacculi, are filled with lardaceous material, so that it is much larger and heavier than in health, and is frequently associated with a similar condition of other organs, especially the liver and the kidney, which are characterised by great firmness, a peculiar waxy-like consistence, and with a distinctness and transparency of the Malpighian sacculi which are not usually very obvious (see p. 44, *ante*).

Lardaceous disease of the spleen is one implying a long-standing and deep-seated cachexia; and, in its most intense form, is seen after protracted caries and necrosis of bone having its origin in scrofula, or syphilis, or even external injury, where the injury leads to protracted bone disease. Hence the question is still undecided, whether the disease arises from a local source, such as the injured bone and the morbid processes going on in it, or whether it is a constitutional general disease.

(*c.*)—*Disease of the Supra-renal Capsules.*

ADDISON'S DISEASE—*Syn.*, BRONZED SKIN, MELASMA ADDISONII.

Natural History.—Disease of the supra-renal capsules, with discoloration of the skin, is a morbid state which establishes itself with extreme insidiousness, whose characteristic features are anæmia, general languor and debility, and extreme prostration, expressed by loss of muscular power, weakness of pulse, remarkable feebleness of the heart's action, breathlessness upon slight exertion, dimness of sight, functional weakness and irritability of the stomach, and a peculiar uniform discoloration of the skin, which becomes of a brownish olive-green hue, like that of a mulatto, occurring in connection with a certain diseased condition of the supra-renal capsules. The progress of the disease is very slow, extending on an average over one year and a half; but may be prolonged over four or five. The tendency to death is by asthenia, the heart becoming utterly powerless, as if its natural stimulus—the blood—had ceased to act.

As a clinical fact, the connection of that condition of the skin known by the name of "bronzing," with various morbid states of the *supra-renal* bodies, cannot be disputed; but the exact relationship and pathological significance of the morbid states thus connected are still open questions, especially as regards the pathology of the constitutional cachexia which exists. Morbid states of the *supra-renal* capsules are not always attended with bronzing of the skin; and symptoms and phenomena of a very important kind have been lost sight of in describing this constitutional disease, while an undue importance has been placed upon the bronzing of the skin. In all the cases a most remarkable and fatal cachexia prevails, and the value of Dr. Addison's observations consists in shewing that a peculiar bronzing of the skin, combined with *asthenia*—of which emaciation is not a necessary accompaniment—attends this cachexia, and indicates organic disease of the *supra-renal* capsules associated with this constitutional state. There are good grounds for believing that Addison himself entertained the belief that death in such cases may be due to the implication eventually of the ganglionic nerves. Some of the symptoms point to this; and of the special phenomena associated with the cachexia, it may be said that the nervous centres are at least impaired. Gastro-intestinal disturbance prevails.

The important features of the disease are—a progressive feebleness of the patient, without any apparent or known cause (*asthenia*), anæmia, general languor and debility, remarkable feebleness of the heart's action, irritability and weakness of the stomach, and a peculiar change of colour of the skin. In most of the cases the early sequence of symptoms appears to have been gradual and almost imperceptible indications of failing health and strength, consisting chiefly of languor and weakness, and indisposition to either bodily or mental exertion, the appetite being impaired or entirely lost, the white of the eyes becoming pearly, the pulse small and feeble, perhaps somewhat large, but excessively soft and compressible. The body wastes, without presenting extreme emaciation, or the dry and shrivelled skin usually associated with protracted malignant disease. Slight pain or uneasiness is from time to time referred to the region of the stomach, and there is occasionally actual vomiting. With every sign of feeble circulation, anæmia, and general prostration, "neither the most diligent inquiry nor the most careful physical examination throws the slightest gleam of light upon the precise nature of the patient's malady; nor do we succeed in fixing upon any special lesion as the cause of this gradual and extraordinary constitutional change." The discoloration of skin is characteristic. It pervades the whole surface of the body, but is most strongly manifested on the face, neck, superior extremities, penis, and scrotum, in the flexures of the axilla, and round the navel. It presents a dingy or smoky appearance, of various tints or shades of deep amber or chesnut brown; or even so universally and deeply darkened as to resemble a mulatto. This distribution of pigment is not confined to the skin, but is also visible in the mucous tracts, as well as in some other structures.

Section VI.—Diseases of the Respiratory Organs and of the Peripheral Parts in connection with them.

The acute inflammatory diseases of the respiratory system are more or less distinctly defined according to the tissue which they implicate and the symptoms to which they give rise. The three structures which mainly take part in the constitution of the lung substance are—(1.) The *bronchial tubes*, terminating in (2.) the *pulmonary air-cells*, *vesicular structure*, *proper substance*, or *parenchyma of the lung;* and (3.) the *membrane covering this parenchymatous part*, forming a portion of that serous sac interposed between the lungs and the walls of the thorax. That portion of the serous sac which immediately invests the lungs is known by the name of the *pulmonary pleura*, while that which is applied against and invests the parietes of the thorax is known as the *parietal* or *costal pleura.* One or more of these pulmonary structures may be associated in the processes and results of inflammation. Thus the bronchial membrane may be inflamed, when the disease is termed *bronchitis;* or the substance of the lung may be inflamed, the disease being then called *pneumonia;* or the pleura may be inflamed—a condition which is described as *pleuritis.* It is rare, however, in practice to find that these morbid states are so completely isolated. Frequently, for instance, with *pneumonia*, or inflammation of the substance of the lung, there is associated more or less inflammation of the air-tubes (*bronchitis*), on the one hand, constituting *broncho-pneumonia;* or there co-exists inflammation of the investing pleura (*pleuritis*), constituting, on the other hand, *pleuro-pneumonia.* Each of these elementary morbid conditions can be distinguished by definite symptoms; and by observing the combination of physical phenomena, their association with general symptoms, and the sequence of their occurrence, determine how far any given pneumonic affection involves one or more of the structures which compose the lung substance.

It is therefore necessary to describe in the following sections the phenomena of inflammation in each of these structures in detail, and also the diseases of the peripheral parts leading to the lungs; but the College of Physicians has not recognised in their nomenclature the combined lesions referred to as distinct diseases.

(A.)—Diseases of Peripheral Parts of the Respiratory System.

Hay Asthma.

Natural History.—A variety of asthma or catarrh occurring generally during the summer months, especially during the inflorescence of the hay crop, or during the drying and conversion of the newly-mown grass into hay in May and June. In connection with the development of this affection, there is usually a susceptibility to the exciting cause, which is some palpable minute emanation from the inflorescence of flowering plants, trees, grasses or fungi. The exciting cause is in the atmosphere. The inhalation of minute particles, such as the powder of *ipecacuanha*, will produce symptoms resembling this affection; so also will fine *dust*, the composition of which is unknown, or at least is not known to contain anything so specific as *ipecacuanha*. The *dust* of grain or *flour* has been known to produce the same effect; and at one time mere effluvia or odours were believed so to affect the nervous system as to cause the occurrence of asthmatic fits. The odours of *mint*, of the *rose*, *various flowers*, and other strong perfumes, have produced difficulty of breathing, with dry cough, as in hay asthma, in some people. The probability is that the mere mechanical influence of certain minute but specific particles floating in the air may be sufficient in some to cause this disease; as in the case of *ipecacuanha*, or inflorescence particles of certain grasses, or of the flowers cut down with the grass in the progress of haymaking. Hence the name ought to be *pollen catarrh* or *pollen asthma*. Such catarrh is often very severe, involving the commencement of the air-passages in an acute attack, with much redness of the mucous membrane of the nose and eyelids.

Treatment.—If the pathology of this disease be accepted, which regards it as the result of irritation (specific or mechanical) from fine particles of matter (indefinite dust or specific powder) floating in the air, the use of a respirator of fine cotton, as shewn in Professor Tyndall's interesting expositions regarding dust and disease, would absolutely prevent the affection, and ought to be tried by those who suffer from it every year about the months of May and June. Mr. Carrick's apparatus for purifying the air would be also a preventive.

Laryngitis.

Natural History.—Inflammation of the mucous membrane of the larynx may be—(*a.*) Acute or œdematous; (*b.*) subacute or catarrhal; or (*c.*) chronic. In the acute form the inflammation is dangerous in proportion to the extent of involvement of submucous tissue and the amount of œdema, which threatens suffocation by rapid closure of the glottis. The infiltration also causes spasms of the glottis.

(a.) *Acute or Œdematous Laryngitis* commences as a slight catarrh, rapidly followed by elevation of temperature and acute febrile phenomena. Vocalisation, cough, and respiration are all more or less modified. The voice, at first hoarse, becomes completely aphonic. The cough is at first clear and shrill, then harsh and croupy, and finally aphonic. In a well-marked case, the brassy tone peculiar to the disease terminates in a hissing noise, and begins similarly by a hissing inspiration in a muffled manner. A peculiar noise like a loud whisper accompanies both inspiration and expiration. Inspiration is from the first laborious and wheezing; afterwards it is very much lengthened and stridulous, and starts sharp from the conclusion of the previous expiration. Mucous râles are heard over the whole larynx. In cases where œdema takes place, and the calibre of the larynx is consequently narrowed, the respiratory process becomes most laborious and painful, and the anxiety of the patient extreme. With the laryngoscope the mucous membrane, at first only hyperæmic, is soon seen to become œdematous; and, from the swollen condition of the epiglottis, the rest of the larynx is often hidden from view. If the vocal cords are visible, they are generally congested and slightly swollen, but not œdematous; the ventricular bands, however, generally quickly take on the œdematous character.

(b.) *Sub-acute or Mucous Laryngitis*, essentially a catarrhal inflammation of the mucous membrane, is usually accompanied by a similar condition of the trachea, and often associated in a slight degree with common faucial catarrh. The hyperæmic condition of the mucous membrane is followed by a slightly increased secretion; and, cell-growth taking place at the surface, the mucous membrane becomes swollen and sodden. There is a very slight, and, indeed, scarcely perceptible deposit in the sub-mucous tissue. The dysphonia or aphonia which is present, is due partly to the altered density of the vocal cords, and partly to imperfect muscular action; for the slight pain which is occasioned by the use of the muscles causes them to be insufficiently employed. It may come on suddenly or gradually, and may disappear without spreading to the deeper structures. The symptoms are similar to those of the acute disease in the earlier stages, and the hyperæmic condition is at once seen with the laryngoscope. There is seldom much constitutional disturbance. It may subside either spontaneously or under treatment, or it may become chronic.

(c.) *Chronic Laryngitis* is essentially a chronic inflammation of the mucous membrane of the larynx, accompanied with slight enlargement and tortuosity of the vessels of the areolar tissue. Cell proliferation takes place at the surface; and instead of the pale semi-transparent mucus usually secreted in small quantities, a more abundant discharge occurs, in which pus is mingled in varying quantities with true mucous corpuscles. The principal symptom is modification of the voice; the respiration is generally little affected; but there is often a tickling cough, with expectoration of small pellets of mucus, and a frequent desire to clear the throat.

Treatment.—In the early stages of *acute laryngitis* a warm, moist, and uniform temperature, with complete rest of the parts, is of the first importance. Not only should the voice be rested, but the tendency to cough should, as much as possible, be arrested by administration of small doses of *morphia*, especially in those cases in which paroxysmal cough is a prominent symptom. Inhalations of hot steam, or of steam impregnated with the volatile principles of *benzoin*, *hops*, or *conium*, are of the greatest service. *Hot poultices* and *fomentations* may also be ordered; and where the œdema is slight, non-depressing *emetics*, as *sulphur of zinc* or *copper*, dissolved in large quantities of *warm water*, are frequently of great service. Where the œdema is considerable, and does not appear to diminish, *scarification* of the larynx, by means of Mackenzie's laryngeal-lancet, is of paramount value. Where, however, from circumstances this measure cannot be carried out, and the disease is advancing, tracheotomy should be performed without delay. All experience points to the fact that, where this operation is performed sufficiently early—and especially in the adult—life is almost always saved.

In *sub-acute laryngitis*, in addition to functional rest, and an equable, warm, and moist temperature, a regular system of medicated inhalation should be prescribed; consisting of such medicines as are contained in the very useful Pharmacopæia of the Hospital for Diseases of the Throat, published by Churchill, 1871. For the administration of these remedies, the Eclectic Inhaler, devised by Dr. Morell Mackenzie, possesses great advantages; for whilst the vapour to be inhaled is thoroughly saturated with the volatile principles employed, and is kept at a uniform temperature, the patient is able to inhale without effort.*

In *chronic laryngitis* stimulating inhalations may also be used with great benefit. Functional rest is of great importance in those cases in which the voice is affected. If complete silence cannot be enforced, the patient should speak only in a whisper. A warm dry climate is also of essential service.

CROUP.

Natural History.—This disease is a non-infectious inflammation of the mucous membrane of the trachea, occurring in children, differing from other inflammations in like tissue in the presence of plastic exudation of a fibrino-albuminous material, which rapidly coagulates upon the mucous membrane of the epiglottis, glottis, larynx, or trachea, and sometimes over all of these parts; indicated by accelerated, difficult, wheezing, or shrill respiration; short, dry, constant, barking cough; voice altered by hoarseness, with spasm of the interior laryngeal muscles, and pain and constriction above the sternum, frequently followed, towards the close of the disease, by expectoration of a membranous albuminous substance, or even of a cylindrical cast of some portion of the breathing tube. The disease occurs in children, and may terminate fatally either in suffocation or exhaustion of the vital powers. Thus the most remarkable pathological phenomena of croup are to be observed in the exudative process which attends the inflammation in the windpipe, and the formation of a false membrane, almost peculiar to children, but sometimes seen in adults. The disease derives its importance from the tendency of the inflammation to attach itself to the opening of the glottis. In childhood the *trachea* is the chief seat of the inflammation; and when the larynx and the fauces are involved, they are so secondarily, and to a less degree. The croupous exudation rapidly coagulates when it is thrown out upon the free surface of a mucous membrane, involving in its lesion the epithelium only, so that when the croup-membrane is detached, the epithelium is quickly reproduced. No loss of substance occurs in the mucous membrane itself, and no scar remains after the membrane is removed or disappears. On the other hand, the diphtheritic process is characterised by the production of a similar *fibrino-albuminous* and rapidly coagulable exudation; but differs from croup in the exudation forming not merely *upon* the surface of the mucous membrane, but *within* its substance. It infiltrates the mucous and submucous tissue, and this interstitial exudation, as well as the swollen elements of tissue, exerts a pressure upon the blood-vessels which results in sloughing (diphtheritic) of a portion of the inflamed mucous membrane. A diphtheritic eschar is the result, and on its separation there is loss of substance and a consequent cicatrix. Every now and then discussions arise as to whether or not croup exists as distinct from diphtheria; and the essential qualities of the two diseases are often in dispute. Any one who has seen much of croup in children can have no difficulty in recognising it as a disease very different from diphtheria in its attack, its course, and its results. A transition from croup to diphtheria is, however, not unfrequent when the malady forms part of, or occurs during the course of such acute infectious diseases as *measles*, *small-pox*, *typhus*, *scarlet-fever*, or during an epidemic of *diphtheria*.

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* It can be obtained of Messrs. Bullock & Reynolds, 3 Hanover Street, Hanover Square, London; or of Maw, Son, & Thomson, London.

Croup may be ushered in by sore throat, catarrhal symptoms, or a short dry cough, and may occur without the general health being sensibly impaired. The attack commonly takes place during the night, the sleep of the child, which was perhaps more or less agitated, being interrupted by fits of *hoarse* coughing. These become more frequent, the respiration more difficult, and marked by a peculiar wheezing, which has been described as like the sound of an inspiration forcibly made with a piece of muslin before the mouth, or like to the sound of air passing through a brazen tube. The little patient also feels a sense of restriction about the throat, as shewn by carrying the hand often to it, grasping the larynx, or passing its fingers into its mouth, as if to pull away something which obstructs the passage.

By the end of the second or third day, sometimes sooner, the tongue becomes white, the heat of the body increased, the pulse frequent, the face flushed, and the countenance distressed. From this point the disease now rapidly advances, and the croupy sound, comparable to the noise which a fowl makes when caught in the hand, attains its height.

Diagnosis is generally between croup and the following diseases—namely, the different forms of sore throat, as in *scarlet fever* and *measles*, *diphtheria*, *bronchitis*, *chronic*, *laryngeal* and *tracheal inflammation*, and *hooping-cough;* and the differential symptoms of each of these from croup must be studied by comparing the definitions, symptoms, and course of each of these diseases, as well as *scarlet fever*, *measles*, *diphtheria*, and *hooping-cough.* In diphtheria there is a specific fever, and the lesion spreads from above downwards, or may commence in the larynx. In croup the lesion commences in the trachea, and spreads upwards. Acute laryngitis is a disease of adult life, and croup is a disease of childhood.

Treatment.—Every case of croup demands the most active, *efficient*, *and energetic treatment.* When the exudation extends to the larynx, the course of the disease in children is so rapid and so fatal that the measures for its suppression must be early. *Bleeding*, and especially *local bleeding*, should be employed, and in most cases to a considerable extent. Two to twelve *leeches*, according to the age of the patient, should be applied over the larynx, and the bleeding should be encouraged by the application of a *linseed poultice* to the throat. As soon as some relief is obtained, a *blister* should be applied along the lateral aspect of the neck on each side, *and not over the trachea.* *Emetics* effect large evacuations, and favour the resolution of the inflammation; while the effort of vomiting may be the means of detaching and of expelling the false membrane, should it have formed. If relief does not ensue on the action of the emetic, *two*, *three*, or *four* grains of *calomel*, with *two* or *three* grains of *James's powder*, are to be given every two or three hours; and a dose of *castor oil* occasionally, till the full effect of the *calomel* as a purgative is obtained. Green fæcal stools, like chopped spinach, are characteristic results of these medicines. Expectorant medicines, *ipecacuanha* and *seneka*, should be given with the mercurials, and be continued after them. Five-grain doses of *iodide of potassium* every two hours, and of *chlorate of potassa* have been used with benefit; and the use of a vapour bath from 75° to 80° Fahr. is not to be neglected.

The medical treatment of croup is so frequently unsuccessful that *tracheotomy* is called for as the means of prolonging life, and as affording an additional chance of the patient's recovery. The evidence also is daily accumulating which shews that tracheotomy, as a remedy for croup, ought to be resorted to much oftener than it has hitherto been, and that *at a much earlier period in the disease,—not as a last resource, when death from asphyxia appears imminent, and after treatment of the most depressing kind.* In country districts, indeed, the performance of *tracheotomy* in a case of croup is almost imperatively called for in the majority of cases, *if some symptoms of amelioration do not follow the steady use of bleeding, emetics, the warm bath, and calomel purgation, pursued for twelve or sixteen hours.*

(B.)—DISEASES OF THE CENTRAL PARTS OF THE RESPIRATORY SYSTEM.

BRONCHIAL CATARRH.

Natural History.—The condition of catarrh (see page 31, *ante*) is attended with infiltration and œdema of the mucous membrane of the bronchial tubes, so that tumefaction diminishes their calibre, attended first with dryness of surface, followed by a watery secretion, which subsequently becomes turbid and yellow, and sometimes with chilliness and the discomfort of what is called a "common cold." Certain conditions predispose towards bronchial catarrh, namely:—(1.) Childhood; (2.) the flabbiness of badly-fed individuals, the walls of whose capillaries are probably weak, running through soft and yielding tissues, with a tendency to hyperæmia and increased transudation. The anatomical constitution associated with scrofula and rickets, is of this description; (3.) a previous attack predisposes to others; (4.) effeminate modes of life. The directly exciting causes are—(1.) Chilling of the skin and the influence of sudden changes of temperature, as sitting in a draught of air when perspiring freely; (2.) Irritants acting directly on the mucous membrane, such as dust, vapours, hot and cold air; and the irritant materials from certain trades, such as that of bakers, millers, and stonecutters. (3.) Impeded evacuation of the bronchial veins; (4.) obstruction to the current of the blood through the great branches of the aorta, below the origin of the bronchial arteries, such as may be caused by the compression of liquid in the peritoneum, accumulation of excrement or gas in the intestines; (5.) as a result of morbid states of the blood, when bronchial catarrh is a premonitory symptom of enteric fever, measles, and small-pox.

The symptoms are generally combined with those of catarrh of the *larynx*, *nasal mucous membrane*, and that of the *frontal sinus* and *conjunctiva*. The morbid condition rarely spreads to the smaller bronchi. Pains "all over," aching of the joints, limbs, and back, with a sense of tightness across the forehead, and chilliness, usually usher in a "common cold." Then follow discharge from the nostrils, at first watery, with copious flow of tears, hoarseness, or rough voice, dryness of throat, furred tongue, thirst, loss of appetite, and quickened pulse.

Treatment.—When the symptoms of a "common cold" first express themselves, and even when the sensations have extended to the chest, as indicated by the hoarseness and tendency to cough, the disease may be at once subdued in a healthy person by a full stimulant (but not narcotic) dose of *opium* or *morphia* (i. e., *one grain of opium or a fourth or a third of a grain of morphia*) at bedtime; or by an *alcoholic diaphoretic* drink; or by *five* grains of *carbonate of ammonia*, or *ten* to *twenty* grains of *muriate of ammonia;* or if the appetite is unimpaired, a full supper, followed by a moderate amount of some hot alcoholic stimulant. If such remedies are delayed too long, the object to be aimed at next is to induce a copious perspiration and a continued action of the skin and kidneys, in the first instance by small doses, frequently repeated, of *antimonial and ipecacuanha wines* or *nitrate of potash*, or *acetate of potash* as well as *bicarbonate of potash* and *aqua potassæ*—combined at a much later period with tinctures of *squills* and *hyoscyamus*. Another object of treatment is to bring about a return of the naturally moist condition of the bronchial membrane. This is best effected by *inhalation* of the *steam* or *vapour of hot water*, the use of *tartar emetic* in doses of *one-twelfth to one-sixth* of *a grain*, the use of *ipecacuanha in one quarter or half-grain doses;* and these may be aided by *hemlock*, *henbane*, *aconite*, or *hydrocyanic acid* in appropriate doses. The object aimed at being to establish a free catarrh—to soften the expectoration, and make the coughing "loose" and easy.

BRONCHITIS.

Natural History.—Inflammation of the air-passages leading to the pulmonary vesicles, or bronchitis, is characterised by hoarseness, moderate cough, heat, and soreness of the chest anteriorly—symptoms which are more and more intense according to the severity of the disease. The natural mucous secretion is at first arrested, but subsequently becomes increased in amount and altered in quality, tending to assume the corpuscular character.

The following forms of bronchitis may be clinically recognised:—(1.) *Acute bronchitis* (a.) *of the larger and medium-sized tubes*: (b.) *capillary bronchitis, and bronchitis of the tubes generally—the "peri-pneumonia notha" of the older writers;* (2.) *chronic bronchitis;* (3.) *plastic bronchitis;* (4.) *mechanical bronchitis*, such as knife-grinders' disease —*carbonaceous bronchitis*, or black phthisis; (5.) *bronchitis secondary to general diseases*, such as typhoid fever; (6.) *bronchitis secondary to blood diseases;* (7.) *syphilitic bronchitis.*

(*a.*) *Acute Bronchitis of the Larger Tubes.*—Bronchitis, of whatever kind, is generally preceded by fever, but more commonly by symptoms of what is commonly called "a *cold*," or "a cold in the *chest*," as already described. It often commences without any previous illness, and the uneasy sensations, frequently commencing about the region of the frontal sinuses, gradually pass down the nasal mucous passages, and thence by the trachea and windpipe are experienced in the chest, especially over the anterior region. The symptoms becoming more developed, are expressed by the hoarse altered voice, the cough, and expectoration. In diffuse inflammation, and especially in *capillary bronchitis*, the cough is dry and without expectoration; but far more generally it is accompanied by sputa, which vary greatly according to the different degrees of inflammation, or according as inflammation is acute or chronic, sthenic or asthenic. In acute cases it is at first a thin mucus, sometimes streaked with blood, then more opaque, and lastly purulent; in more chronic cases it may be merely a muciform saliva, or a gelatiniform mass; or it may be like the unboiled white of egg, and so tenacious that it may be poured from one vessel into another without separating. In other instances it is puriform, varying from a laudable pus to a red or green putrilage. When purulent it is usually formed into sputa, but in a few cases it is thrown up in large quantities unmixed, as from an abscess. The quantity of matter expectorated also varies greatly; sometimes only a few sputa in the morning, at others half a pint or a pint in the twenty-four hours; while some patients actually die suffocated from the immense quantity which is suddenly poured out, causing obstruction of tubes and collapse of the vesicular structure of the lungs.

The natural and healthy respiratory sound in the adult is changed by bronchitis to a tolerably sharp sound, which, when multiplied from a number of bronchi similarly diseased, resembles a chirping like the bass notes of the violoncello. The sounds thus embrace a musical scale of considerable compass, the principal and more marked division of which compose the *sonorous* and *sibilant* râles (see page 412, *ante*). Besides the alteration of tone of sound in bronchitis, its quality is also affected by the presence of liquid matters within the cavity of the bronchi; and hence we have it interrupted and modified by the air passing through bubbles of mucus; and as the size of these bubbles and their viscidity vary, so the sounds vary. Sometimes this mucus, instead of being fluid, hardens so as to adhere and play as a valve, giving rise to a clicking noise. The sharp chirping sound is more to be feared than the graver and deeper notes; for grave sonorous notes originate in the larger tubes, chirping whistling notes in the smaller; and the danger in bronchitis increases in proportion as the finer bronchial tubes become involved. When the sounds of expiration are also much prolonged, severe bronchial inflammation is indicated. In some cases the respirations are greatly accelerated, varying from 36 to 50 or 68 in a minute, especially in cases of capillary bronchitis. The pulse at the same time rapidly loses its strength, and becomes excessively frequent—120 to 150. The ratio of the respiration to the pulse is therefore greatly altered from the normal standard—that is, about 4 or 4½ beats of the pulse for every respiration; and thus *pulse-respiration* ratios of 3·0, 2·5, or 2·25 to 1 are not uncommon.

(b.) Acute Catarrh of the Smaller Bronchi (*Capillary Bronchitis*).—Here the cough is of far more violent character from the commencement, and the sputa scanty. The seat of pain in the chest is mainly at the points of insertion of the muscles upon the chest and epigastric regions, from the spasmodic jerking movements of the act of coughing, which is of a violent character, and continues in long paroxysms. The sputa from these smaller bronchi contain no air, and are specifically heavier than water. They are extremely tenacious, and retain the shape of the small thread-like tubes from which they come. They, therefore, cling to the lighter and frothy secretion of the larger tubes, which, being full of air, floats on the surface of water, and the fine filaments of the adhesive thread-like exudation can then be seen hanging in the water, suspended from the frothy mucus

which floats on the surface. The attack may begin with shivering, though an initial chill is much less frequent than in pneumonia. Headache is often complained of, the tongue is furred, the face pallid, and the expression anxious from the outset. There is a feeling and an aspect of general debility out of proportion to the objective symptoms, the patient having the appearance of being in the first stage of a continued fever. The breathing soon becomes hurried and somewhat laborious; an incessant hacking cough sets in, which is generally dry, with the occasional expulsion of one or more greyish, or yellowish-grey, stiff pellets; or there is scarce frothy expectoration. The pulse-rate is quickened, the skin dry, and its temperature variable. (There is yet no reliable record of the body-heat.) These symptoms soon grow worse; the breathing becomes more accelerated and difficult, and the breathlessness more harassing. The ratio of the respiration to the pulse is always high, the respirations going up to sixty or even seventy in the minute, with a pulse-rate of 120 or 130.

(*c.*) *Chronic Bronchial Catarrh.*—The basis of all the symptoms are those of catarrh already described; and this form of bronchitis is an extensively prevalent one. A frequently relapsing and protracted catarrh, recurring habitually once or twice a year in spring or autumn, or both, commences the chronic affection, the patient generally remaining exempt during the summer, till at last the symptoms and the catarrh are more or less constant all the year round.

(*d.*) *Plastic Bronchitis with Casts of the Bronchial Tubes.*—In this affection a lymphy exudation is thrown out on the mucous surface of the bronchial tubes and their ramifications, forming false membranes or casts of the bronchial tubes, which are sometimes expectorated, with catarrhal symptoms more or less acute. The disease happens at all ages, but more usually between twenty and fifty years of age (oftener in males than in females), and generally associated with some constitutional disorder, such as rheumatism, gout, or scrofula, or with an aneurismal or other tumor pressing on the bronchi. Such a form of bronchitis is known and described by the various names of *plastic bronchitis*, *bronchitis crouposa*, or *bronchité pseudo-membraneuse.* It is not to be confounded with cases of diphtheria or of croup. The health in some instances is excellent until the sudden onset of the disorder; but generally it occurs in persons of delicate constitution, who have suffered and are suffering from pulmonary disease, *inherited* strumous diathesis, a liability to cutaneous affections, to asthma, or hæmoptysis. Two forms of the peculiar plastic expectoration are described:—(1). *A moulded coagulum of blood;* (2.) *a condensed,* *lammellated*, *solid*, or *tubular membrane.* Such forms of expectoration may be expelled in shreds, or in oblong or rounded bodies, sometimes as large as a filbert; which, when macerated in water for a short time, gradually expand into a stem and branches; or they are expelled as cylindrical casts of the bronchi, varying in diameter from a crowquill to a writing-pen or drawing-pencil, and from one to three or four inches in length, with small, divergent branches and minute terminal points, resembling some vegetable roots with their radicles or rootlets. As many as ten distinct subdivisions have been seen. They come from as low down as the second, third, and fourth bronchial ramifications. They are of a dull, white colour, or occasionally brownish, from the admixture of blood. They have been deposited or exuded in successive layers; being composed of tough, concentric laminæ, between which a fine probe can be passed. The main stem is sometimes solid and sometimes hollow; or portions may be solid and others hollow.

The *symptoms* are those of slight catarrh, which do not attract attention till the appearance of the peculiar sputa, after which relief is immediate, and lasts till there is a fresh accumulation and another exacerbation, followed by the same phenomena of detachment, expulsion, and relief. Several such paroxysms may occur in the twenty-four hours. Hæmoptysis may occur.

Treatment.—In *acute bronchitis* the chest must be covered with *hot poultices* and an *oil-silk jacket* worn over them. *Dry cupping*, in some instances, may give relief to the urgent symptoms. *Muriate of ammonia*—two grains every two hours—either alone or in combination with the *chlorate of potash*, and also *carbonate of ammonia*, have had a certain reputation in capillary bronchitis, especially in the later stages. The tendency to death is by apnœa, from the imperfect oxygenation of the blood. The patient must be properly and adequately nourished, and *stimulants* are often required. In *chronic bronchitis*, *tartarised antimony*, administered in solution in doses of *a sixth* or *a quarter of a grain*, *every three or four hours*, conduces to free secretion, and generally to mitigate the symptoms of the disease. *Digitalis* is a useful adjunct to the antimonial treatment; and the air-passages should be fomented by the inhalation of moist warm air, as by the steam of hot water, the secretions being at the same time stimulated, so that the bowels act freely. When the expectoration becomes thicker and less copious, the antimony may be decreased, and *squills*, or *ipecacuanha*, with *paregoric*, given. After this a *blister* should be applied to the chest; and a large *linseed poultice* should be placed over the blistered part, and continued for many hours, which will not only keep the ulcerated surface open, but gratefully foment the part and relieve the patient. The bowels should be freely evacuated by a purgative dose of *calomel*, combined with *compound jalap powder*, and they should subsequently be kept in regular and gentle action by some neutral salt, such as the *sulphate of magnesia* in the *liquor ammoniæ acetatis*, combined at the same time *with some nitrate of potass.* The *compound jalap powder* is a most useful remedy. Œdema is greatly relieved by its use, whether of the lungs or of the body generally. The neutral *citrates*, *tartrates*, or *acetates* of the alkalies are useful eliminating remedies. In the acute form of *plastic bronchitis*, *muriate of ammonia* and the alkalies and *odide of potassium* may be given, with an occasional emetic, and inhalation of the *vapour of hot water*, or use of the *Turkish bath.*

Dilatation of the Bronchi.

Natural History.—A cylindrical, fusiform, or saccular dilatation of a bronchial tube, or of several tubes, at one or more points, or through a considerable portion of the second, third, and fourth divisions of the air-tubes in one or more lobes, generally the lower and middle, with atrophy of the muscular and elastic coats, has been described under the name of "*bronchiectasis.*" The expectoration is muco-purulent and fetid. True bronchiectasis may arise quite independently of all other pulmonary affections; but there are several minor varieties which result from other changes in the lungs, such as from *hooping-cough; suffocative capillary bronchitis; stricture of bronchi; long-standing indurations of lung-substance, tubercular or inflammatory; the remains of chronic tubercular cavities*, or *abscesses in the lung tissue.* The most important forms are—(1.) *The general or uniform*, in which there is a cylindrical or fusiform dilatation of a tube, or of several tubes throughout considerable stretches of their extent; (2.) *the saccular*, or ampullary, in which there occurs an abrupt dilatation of a tube at a particular point, or at several points. The disease is not uncommon; and is of interest and importance on account of its alliance with forms of pulmonary consumption. The disease comes on insidiously; but gradually symptoms of bronchitis become well marked. Breath and sputum become fetid, and general health is impaired. Decomposition of the secretions is followed by lung consolidation, ulceration, abscess, or gangrene. Perforation of the pleura, empyema, or pneumothorax may prove fatal; or death may result from exhaustion due to the constant discharge of the sputum. A peculiar febrile disturbance, resembling *septicæmia*, may also terminate life. Unfortunately, the tendency is to a fatal result; but recovery may take place—1. *From cretification of the contents of the dilated tubes, and the conversion of their walls into a sort of fibrous capsule;* 2. *from penetration of the pleura and thoracic parietes, and discharge of the contents outwards.*

The most characteristic symptoms are—*the fetor of the breath*, the *characters of the sputum*, and the *cough*. *Blood* is sometimes expectorated with the sputum in large quantities, as in phthisis, at other times merely in streaks over the expectoration. *Cough* is frequent, and occurs in paroxysms, but is moist, soft, and usually quite painless. After the fit of coughing, large quantities of the sputum are brought up with difficulty. Exertion induces dyspnœa. *The physical signs* depend on the form, size, and extent of the dilatations. *Inspection* may shew depression over the site of the affected lung. *The application of the hand* may detect increased fremitus. *Auscultation* gives varied cavernous moist râles, sometimes even gurgling—and the site of these sounds aids to distinguish them from those of phthisis, also the history and progress of the case, during which auscultation must be frequently repeated.

Treatment.—Opiates to relieve cough; *balsamic remedies* (*tolu*, *tar*, *turpentine*, *copaiba*, *cubebs*) and *astringents*, like *catechu* or *rhatany*, with the use of *counter-irritants* and the *inhalation* of variously medicated *vapours*, are all useful aids in ameliorating the condition of the patient. *Muriate of ammonia* and the alkalies are also to be recommended. *Inhalation of disinfectants*, capable of being so used, such as *creosote*, *carbolic acid*, *sulphur vapour*, *turpentine*, and the like, are of special service.

(SPASMODIC) ASTHMA.

Natural History.—A disease which culminates in paroxysmal attacks of difficult breathing, of longer or shorter duration, is so named. The dyspnœa seems to be immediately dependent on more or less extensive contraction of the smaller bronchi, and due to tonic spasm of their circular fibres. Breathing is accompanied by a wheezing sound, a sense of constriction in the thorax, great anxietas, and a difficult cough. The attack usually terminates by the expectoration of a quantity of mucus from the lungs, which varies considerably in appearance and in amount. In some instances the mucus is thick and heavy, in others it is light and frothy, whilst in the severer forms of the disease there may be only a few dark pellets coughed up before relief is obtained. In the hours immediately succeeding the fit a remarkable diminution of the urea and chloride of sodium may occur, which would imply a considerable arrest either of formation or elimination, probably the former, or to the starvation that is generally enforced at that time. Not unfrequently asthma has been confounded with dyspnœa; and the terms *dyspnœa*, *asthma*, and *orthopnœa*, were formerly employed to designate different degrees of difficulty of breathing. There are many good reasons for regarding asthma as a general or constitutional disease, rather than a merely local one of the respiratory organs ; and it is believed by not a few to be connected with the gouty or rheumatic diathesis. The disposition of the attacks to recur at distant but gradually diminishing intervals; the division of each attack into nightly paroxysms, with marked remissions during the day; the duration of the earliest fits for several days or a week, are all circumstances which point to the constitutional nature of the affection.

The exciting causes of the paroxysms are mainly due to fatigue and physical exhaustion—sudden or violent mental emotion—certain conditions of the digestive organs—gastric irritation—the irritation of a loaded rectum—irritation of an eruption on the skin and its sudden subsidence—the irritation of certain substances and articles of food, such as cheese, nuts, almonds, and raisins, sweet things generally, salted meats, condiments, preserved and highly seasoned foods, fermented liquors, especially malt liquors, and sweet wines.

All true asthma is spasmodic, and on inspecting the chest of a patient labouring under a severe paroxysm, the whole upper part seems almost motionless, while the inferior portions are acting within a very confined range All the muscles passing from the head to the shoulders, clavicles, and ribs are rigid. The abdominal muscles, however, act most powerfully to increase the capacity of the chest, and its walls are kept fixed in a condition of extreme inspiration. The chest is enlarged in every way, the diaphragm descends, the abdomen seems fuller, and its girth is increased. The stethoscope teaches us that the whole of the lungs, but particularly the posterior lungs, are labouring with a loud and deep sibilous sonorous wheeze, accompanied with a mucous rattle, sometimes loudest on inspiration and sometimes on expiration. No respiratory murmur exists. Dry tube sounds alone are heard —rhonchus and sibilus of every variety, note, and pitch. There is complete stagnation of air in the chest. The sounds are so small that they seem to indicate spasmodic constriction of the smaller tubes; and the universal diffusion of the sound shews that the constrictions are universal. These spasms may also be observed to be constantly disappearing in one place and making their appearance in another, so that the sounds are continually changing their character and their site. Percussion shews that the lungs are distended with air; and should an air-cell have burst, a rubbing sound will be heard, denoting the effusion of air into the cellular substance of the lung. As the fit subsides, the respiration becomes puerile, and by degrees the breathing returns to its usual state. In fatal cases the respiration becomes tracheal, slight hæmorrhage perhaps takes place, and after a severe struggle the patient dies; although death rarely takes place immediately from uncomplicated asthma. In some cases the fit lasts a few minutes, in others two or three hours; the whole night; three or four days; and in others as many weeks.

Treatment comprises what should be done during the fit, and what should be done during the intervals, with a view to correct the obvious constitutional state, which every now and then culminates in a paroxysm of asthma. When the patient is labouring under a fit, our efforts must be directed to tranquillise his suffering and shorten the attack. Any stomachal exciting cause actually present and in operation must be removed by an *emetic;* an undigested meal or constipation must be got rid of or relieved by an *enema.* The patient should be supported by strictly *tonic regimen;* and *camphor mixture*, to the extent of about an ounce and a half, combined with a drachm of the *spirit of nitrous ether* and some *morphia* or *tincture of hyoscyamus*, may be given every hour, or every two hours, for a short time. In some cases *asafœtida*, *castor*, *musk*, or *dilute hydrocyanic acid*, to the extent of ♏ iij. every six hours, may be substituted. If the fit should occur after a hearty meal, and after an emetic has been given, the *tincture of rhubarb* or the *sulphate of magnesia* should be continued in repeated small doses. If the attack be prolonged, arrow-root or sago, with small quantities of wine or brandy, may be necessary to support the patient under his laborious and exhausting sufferings. *Ipecacuanha*, *tartar emetic*, *codeia*, and *tobacco* are the drugs which most rapidly relax spasm as direct depressants. There is, however, great danger in the use of the latter, from unmanageable and dangerous collapse. *Ipecacuanha* is the most manageable of these remedies, and ought to be given in a dose of twenty grains at the onset of the paroxysm. The tobacco should be smoked from a pipe.

But it is the treatment during the interval which is all-important. The diet ought to be strictly prescribed. The amount must be regularly weighed out, and adhered to with the greatest strictness, the hours of meals being most rigidly fixed as follows:—*Breakfast* at *eight* A.M., to consist of half a pint of green tea or coffee, with a little cream, and two ounces of dry stale bread. *Dinner* at *one* P.M., to consist of two ounces of fresh beef or mutton, without fat or skin, and two ounces of dry stale bread or well-boiled rice; three hours *after* dinner (not sooner) half a pint of weak brandy and water, or whisky and water, or dry sherry and water, may be taken, or toast-water *ad libitum*. *Supper* at *seven* P.M., to consist of two ounces of meat as before, with two ounces of dry stale bread. The patient is not to be allowed to drink any fluid whatever within one hour *before* his dinner or supper, and not until three hours after either of these meals. At other times he is not limited as to drinks, otherwise than that all malt liquors are to be prohibited. *Soda* or *seltzer*-water may be indulged in at other times when thirsty. With this dietetic treatment sedatives are to be given as follows:—Three grains of the *extract of conium* are to be taken four times a day—namely, at the hours of seven, twelve, five, and ten,—the dose to be gradually increased to five grains four times a day. To each of these pills a *fourth* of a grain of the *extract of Indian hemp* may be added, which may be gradually increased to one grain in each dose.

PNEUMONIA.

Natural History.—Inflammation of the lungs, or pneumonia, in its acute, sthenic form, uncomplicated by constitutional or specific diseases, runs a definite course, and is expressed by severe febrile symptoms, which come on suddenly, attaining in a few hours a great intensity, and which undergo a no less sudden abatement or improvement between the fifth and tenth day, in proportion to the severity of the disease and the textures implicated; while the local productive results of inflammation in the form of the lung-lesion are yet intense, but which also are eventually removed. This natural course of pneumonia is materially modified by constitutional or specific diseases, especially if any organ, such as the kidney, the heart, or the liver is involved; or it may be modified by the secondary contamination of the blood by absorption of lung-exudation in the later stages of the disease, tending to inflammation of the other lung, to pleurisy, to pericarditis, or to blood-coagula in the cavities of the heart or great-vessels.

The only variety recognised by the College of Physicians is *lobular pneumonia*; and the term "*secondary*" has been applied when pneumonia occurs as a complication of some other disease. On the other hand, the following varieties as described by Niemeyer are those now more generally adopted, namely:—

(1.) *Croupous Pneumonia*, in which the air-cells are involved in a morbid process identical with that which attacks the mucous membrane in tracheal and laryngeal croup, is sometimes also called *acute sthenic pneumonia*, the characteristic phenomena of which are evolved in a regular and consecutive manner. The intensity of this variety of pneumonia is to be judged of by the concurrence of the phenomena of temperature, pulse, and respiration, so as to call all cases slight that fall *below*, and all cases severe that are *above* those averages in which *the temperature records* 104° Fahr., *the pulse more than* 120, *and the respirations more than* 40 *in the minute during the height of the disease.* It is only by a rigorous application of some such rule to the cases of pneumonia which are grouped together to furnish statistical data as a guide to treatment, that anything like trustworthy results can ever be obtained. Every case must also be judged of by (a.) *The course of the local lung-symptoms* as to crepitation and hepatization, sputa, and pain. (b.) *The condition of other organs*, especially of the other lung and the heart and blood-vessels; the liver and the eliminating organs generally, are also to be frequently inquired into.

The commencement of primary croupous (acute) pneumonia is marked by a rigor in almost all cases which lasts from half an hour to several hours, before giving place to a sensation of heat; but nevertheless body temperature is appreciably elevated during this algide stage; and except in *ague* and *pyæmia*, rigors of equal violence to those in pneumonia are not met with in any other disease. In ague and pyæmia, however, the rigors are repeated; in pneumonia the rigor is not repeated; and hence it marks the commencement whence the duration of the disease is thus determined. In children convulsions may take the place of rigor.

(2.) *Catarrhal Pneumonia* is always preceded by catarrhal bronchitis, and may be in some cases a form of capillary bronchitis, extending to the air-cells of the lungs; hence, many of its features are similar and undistinguishable from capillary bronchitis. It is often a complication of measles and of hooping-cough. It is the form to which the name or variety of lobular pneumonia has been applied, because it is limited to lobules, and as such it is disseminated and insulated in contra-distinction to the croupous form which affects whole lobes. The lesion is recognised by the scattered condensed foci of inflamed tissue which pervade the lungs; chiefly abounding towards the periphery, where they are more or less wedge-shaped. On section these condensed portions have a smooth homogeneous appearance, without the granular characteristics of *croupous* pneumonia, impervious to air; and a dilated bronchole filled with tenacious secretion may generally be seen in the centre of these condensed foci, which go through the same stages of pneumonia as have been already described. The cough is painful; and the temperature of the body always becomes elevated when catarrhal pneumonia supervenes upon catarrhal bronchitis. In simple capillary bronchitis the temperature rarely exceeds 102° Fahr., but when catarrhal pneumonia supervenes, it may soon reach 104° or 105° Fahr., with frequent pulse and flushed face. Collapse of the lung extends in proportion to the foci of tissue involved, and progress to a fatal end may thus be more or less rapid. When resolution sets in, it commences gradually and progresses slowly but steadily.

In these forms (1.) and (2.), the products of inflammation are thrown out upon the free surface of the mucous membrane of the air-cells, the tissue of the lung itself suffering no essential lesion.

(3.) *Chronic or Interstitial Pneumonia.*—The little connective tissue which pervades the lung is here the principal texture involved, so that a hyperplasia or growth of its substance takes place, resulting (1.) in considerable augmentation of the substance of the lung, with a diminution of the air spaces; and (2.) subsequent contraction of the new material. It scarcely ever occurs as an independent lesion, but is often the result of prolonged irritation, as from inhalation of iron or steel filings, fine dust of coal or other substances, which establish first bronchitis, which is followed by the induration, which is the chief anatomical character of this chronic form of pneumonia. Before contraction of the new material commences, the lung substance in interstitial pneumonia is solidified and void of air, hyperæmic and red, or of a pale, bluish-grey colour. After the new tissue has contracted, various forms may be assumed by the lesion, caused by bands or condensed masses of tissue running through the pulmonary substance, sometimes containing much pigment and grating like cartilage under the knife. It is usually an affection of middle and advanced life, and is most frequently met with among spirit-drinkers. It has sometimes been described in England and America under the name of "*fibroid degeneration of the lung.*" It has been regarded —(1.) As a variety of phthisis; (2.) as a result of unresolved pneumonia; (3.) as a special form (interstitial) pneumonia; (4.) as a peculiar growth or hypertrophy; (5.) as a pulmonary cirrhosis; (6.) as fibroid degeneration of the lung. In general both lungs are affected; and if only one, generally it is the left that suffers, commencing in the upper lobes. Cavities are apt to form, while constant cough, with expectoration and gradual waste, brings the disease under the form of pulmonary phthisis (to be afterwards considered), the progress of which is very slow, extending over several months, and even years.

The general symptoms of pneumonia are some antecedent fever, shivering, more or less violent, and often bronchitis. In a few cases, however, consolidation may be complete ere any primary affection is observed. In others, failure of the appetite, general weakness, and wandering pains in the limbs and chest, precede any definite attack by several days. The patient is restless and uneasy; his respiration difficult and hurried—from 30 to 50 in a minute—according to the amount of lung whose function is suspended; his cough frequent, and his expectoration streaked with blood; but notwithstanding this symptom he seldom, unless the pleura is affected, suffers pain. The aged, however, seldom complain of difficulty of breathing during the progress of the disease, whatever may be the frequency of the respiration, so that it is necessary to count the movements of the chest in old people, to avoid all sources of error. Obscure and latent forms are frequently met with in aged subjects labouring under chronic disease of the brain, heart, or some other internal organ. The pulse is full and frequent—from 100 to 120; the countenance livid; the nostrils dilated; the tongue and lips more or less livid, the former of which is coated with a white or yellow mucus. The patient inclines to lie on his back. Should the case tend to a fatal end, the tongue becomes brown and typhoid, the pulse more rapid, profuse sweats break out all over the body, and at length the mind wanders, and death takes place by *coma* or *apnœa.*

In typical cases of acute croupous pneumonia certain groups of symptoms are more or less constantly combined,—namely, accelerated respiration, with more or less difficulty of breathing, and rapidity of pulse. These are so correlated that the severity of the case is best measured by observing the correlation of these symptoms. The cough is at first dry, but soon there appears a scanty, semi-fluid, grey, frothy, mucous expectoration, which becomes more and more viscid, and which, in the first stage of the disease, remains of a catarrhal yellow or white appearance. Afterwards, during the second stage, it becomes still more tenacious, reddish, or rust-coloured; and the heat of skin increases, with thirst and marked prostration, and a pulse increasing in rapidity. When much œdema of the lung prevails, the general symptoms are most marked; the uneasiness being greater, the respiration louder and more difficult, the countenance more livid and swollen, the cough more harassing, the expectoration more abundant, and the attempt to lie down impossible. A gangrenous state of the lung is determined chiefly by the intolerable fetor of the breath.

Physical signs of pneumonia are to be appreciated by *inspection*, *palpation*, *mensuration*, *percussion*, and *auscultation.* In pneumonia the natural sounds are altered, the sound on percussion being duller than natural, while the bronchial respiration undergoes still more remarkable alterations; and these modifications enable us, by percussion and auscultation, to determine the nature and seat of the disease. During the *first stage*, inspection of the chest shews that the costal movements are not materially diminished, unless the motions of respiration are restrained by pain. It is only by percussion and auscultation combined that the existence of pneumonia can be determined. By *percussion* a peculiar resonance may be emitted by that portion of the chest at which pneumonia is beginning, which ceases after the commencement of exudation, to be replaced by dulness more or less marked according to the extent of the lung involved, the degree of consolidation of tissue, the amount and position of consolidation in relation to the surface of chest, and the amount of intervening healthy lung. By *auscultation* during the second stage, tubular breathing is found to be a most constant accompaniment alike in the adult and in old age. The respiration is of a hollow character, diffused throughout the hepatized portion—tubular towards the centre, but harsh and blowing towards the periphery of the affected part. Where the tubular breathing prevails, râles and rhonchi are absent; while vocal resonance is intense, usually of a metallic ring.

Treatment.—One of the most discordant topics in the science of medicine seems still to be the treatment of pneumonia. At one time, especially about fifty years ago, large *bleedings* were the rule. But Laennec and Louis were convinced, from their experience, that large bleedings were by no means successful in practice, and that in some cases they were absolutely injurious. The same difference of opinion was held with respect to large doses of the *tartrate of antimony.* These discrepancies are now to be explained by the circumstance that pneumonia, like other inflammations, not only varies in type and severity in different cases, but that "extremes in practice," whatever they may be, when adopted as a *rule absolute*, applied to all cases can never give satisfactory results. It would now be an unwarrantable error to make excessive bleeding the basis of remedial measures in all cases of pneumonia. At the same time there can be no doubt that we have it in our power materially to modify the course and to shorten the duration of pneumonia by the judicious employment of *blood-letting*, *leeches*, *tartar emetic*, *certain salines*, and *opium*. (See page 77 *et seq.*, *ante.*)

The correlation of the body-temperature, the number of the pulse, and the respirations *per minute*, furnish the best guide as to the course to be pursued in the treatment of acute pneumonia. If the pneumonia is not intercurrent to some other disease, but happens in a person otherwise healthy; and if the mean body-temperature remains below 104° Fahr., and the pulse does not exceed 120 beats in the minute; and if the respirations never exceed forty in the same time, the case must be regarded as a typically favourable case, which will certainly begin to get well when the cycle of the pneumonic process is complete—*i.e.*, in from three, four, seven, or eight, to twelve days without any special medicinal treatment, but with careful nursing, and the maintenance of absolute rest in the horizontal position, and a strictly antiphlogistic diet. Hence has arisen the expectant mode of treatment; and unless warranted by certain special indications, active interference has an unfavourable effect upon the course of such a pneumonia. Blood-letting is no specific. It does not cut short a pneumonia, and should only be had recourse to when special indications for it arise. (See page 77 *et seq.*, *ante.*)

Antimony is another remedy which has gone through several extremes of administration also in the treatment of pneumonia. Few, if any, now believe in the usefulness of extremely large doses of *antimony;* but when the remedy is cautiously administered as a sedative, or diaphoretic and expectorant, in doses of the *eighth* or *twelfth of a grain*, every *two* or *three* hours, and in doses of a *sixth* or a *quarter of a grain*, in the more sthenic attacks, it is a most valuable remedy. It is contra-indicated in gastric or gastro-enteric irritation—cases in which the stomach will retain no food, scarcely even water when given alone; and it is under such circumstances that *alcohol* in *stimulant* doses often repeated is of use; or the *antimony* combined with *spirit of chloroform.*

In the published statistics which bear upon the treatment of pneumonia, little or no reliance can be placed as a guide to practice. The results revealed are so variable and contradictory as to deprive them of the slightest claim to authority; and no satisfactory conclusion can be drawn as to treatment from cases massed together, no one similar to another as to severity. Each case must be studied by itself, as well as each epidemic. The numerous qualifying conditions connected with age, season, climate, epidemic and endemic influences, earliness of treatment, stage, extent, pyrexia, and complications, all tend to modify the line of treatment required in each case.

The treatment of pneumonia demands not a single remedy, but many agents and their proper *combination* must be sought for in the management of individual cases.

In sthenic cases characterised by intense heat, above 104° Fahr., dryness of the skin, a full resistant pulse of 120, rusty coloured expectoration, *and great oppression of the breathing*, to the extent of beyond forty respirations, blood-letting had recourse to at the beginning of the attack, in the stage of congestion before the *fastigium* of the pyrexia (not later than forty or fifty hours after the initial rigor), not only affords immediate relief to the breathing, but appears to remove the extreme tension of the vascular system and to promote secretion. The most suitable time is during the evening exacerbation. The indications for blood-letting should be decidedly marked before it is undertaken; and the amount of blood to be lost must vary in each case, according to the oppression of breathing, the type of the disorder, and the constitution of the patient, as well as to whether or not there is any prevalent epidemic tendency associated with the pneumonia. It is seldom necessary to draw more than from *ten* to *sixteen* ounces of blood; and *eight* or *ten* ounces will usually suffice. After bleeding, the pain in many instances ceases, expectoration takes place more easily, and alters in character; the skin becomes moister, and evidence is afforded of the action of remedies which before proved inoperative. But in very many cases it is either unnecessary or inexpedient to let blood—inexpedient chiefly because of the constitution of the patient being shattered by excesses, constitutional disease, anxiety, and mental distress; and *excessive blood-letting*, under whatever circumstances practised, impairs the strength, leads to great impoverishment of the blood, arrests the actions on which the absorption of exudation-matter depends, exposes the patient to risk, and induces a tardy convalescence. Bleeding, therefore, ought certainly not to be employed *after* extensive consolidation of the lung has taken place. A combination of *antimony* and *calomel* is then believed to have saved a much larger number of cases than *antimony* alone; a quarter of a grain to a grain of the *tartrate of antimony*, combined with one grain of *calomel*, given every four or every six hours, according to the severity of the disease, is the treatment to be adopted in such cases. Previous to its use the bowels should be well cleared out; and after the mercurial effects are indicated by the condition of the gums, the further administration of the remedy should cease. The efficacy of *mercury* is most conspicuous in those cases of pneumonia in which *tartar emetic* is of least avail; in other words, in those instances in which the productive results of inflammation are the greatest, in cases in which crepitation does not exist at all, or is replaced in a few hours by intense tubular breathing. In cases of simple serous pneumonia simpler remedies are sufficient. Two grains of *ipecacuanha* given every four or six hours have frequently been followed by the recovery of the patient. The cases in which *tartar emetic* fails to exercise a curative action are those in which hepatization proceeds with extreme rapidity; in which crepitation either does not exist at all, or is of very short duration, giving place after a few hours to intense tubular breathing; and those which are marked by extreme depression almost from the first. *Salines* and *stimulants*, with *calomel* and *opium*, if necessary, are the most efficient means of treatment in such cases.

The influence of many other proposed remedies, such as *aconite*, *carbonate of ammonia*, *digitalis*, *cold water compresses*, *linseed poultices*, *turpentine*, *opium*, *hydrochlorate of ammonia*, *iodide of potassium*, *quinine*, must be studied with reference to special requirements in each case.

EMPHYSEMA.

Natural History.—This disease occurs in two forms—(1.) *Vesicular Emphysema*, in which there is a misshapen enlargement of the several air-cells of the lungs, by dilatation of them and blending of them into one great cyst, attended with gradual effacement of the functional blood-vessels distributed over their walls; and anæmia of the lung in the affected parts, tending to dilatation of the right side of the heart, with anasarca. (2.) *Interlobular Emphysema*, in which air infiltrates the meshes of the sub-pleural and interstitial connective tissue of the lungs.

Some confusion has arisen from the use of the term "*Emphysema*" (which means the presence of air in the connective tissue) to designate dilatation of the air-cells of the lungs. Here the air is where it ought to be; but the air-cells are too large and misshapen, and contain too much air; and being limited in this way to the vesicles of the lung, this form of disease was named by Laennec "*vesicular emphysema.*" The dilated air-vesicles vary from the size of millet seeds to that of Barcelona nuts, or even larger; but when they form a great expansion, it is probable that many air-vesicles are dilated into one common cavity by rupture of the partitions which separate them from each other. The dilated vesicles may be seen clearly through the pulmonary pleura; they also protrude from the surface of the lung. The emphysematous parts are pale, and sometimes quite white; the tissue is drier than normal; it cannot be easily emptied of air, resembling the lungs of a reptile rather than those of a human being. It possesses fewer capillary vessels; and they become obliterated by distension of the air-cells. The lung is therefore anæmic, and contains less moisture than the normal lung. It is so dry and light that it floats much higher in the water than a healthy lung.

In typical cases the patient is short-winded and distressed by a constant sense of fulness and oppression at the chest, and generally seeks advice after suffering and discomfort have become too great for him to bear any longer. The difficulty of breathing is often aggravated by spasm, as in *asthma;* and emphysema is a frequent consequence of that disease—the one re-acting on the other, so that the phenomena of each are mutually aggravated. The physical signs are, incompleteness of the act of expiration, the thorax remaining prominent and round over the emphysematous lung. In spare persons the clavicles are not well defined. Percussion over the bulging parts especially yields a peculiarly clear and resonant sound; and although there is thus shewn to be abundance of air underneath the part which yields such a sound, yet the *vesicular murmur* of breathing is extremely indistinct, shewing the air is not in motion there. It is shut up in the enlarged air-cells. The disease tends to impede the circulation through the lungs, and so to produce hypertrophy, with dilatation of the right side of the heart, nervous congestion of the head and face, attacks of palpitation, paroxysms of cough and dyspnœa, œdema of the feet and legs, general anasarca; and dropsical effusion is a frequent termination.

Treatment.—Apart from the management of the bronchial congestion, on the principles already given under *bronchitis*, little can be done for the special treatment of *emphysema.* If bronchial spasm prevail, Hoffmann's anodyne may give relief. It is the *spiritus ætheris* of the British Pharmacopœia, of which *thirty* to *sixty minims* may be prescribed in *camphor* water, or in *spiritus ammoniæ aromaticus*, or in *volatile tincture of valerian;* or it may be combined with stimulant doses (*one grain*) of *opium*; or with *twenty minims* of the *æthereal tincture of lobelia*, *belladonna*, *conium;* or *æthereal tincture of Indian hemp* and *hydrocyanic acid* may each in turn be found of service. Dry cupping between the shoulders often relieves passive pulmonary congestion; and if an attack is imminent, an emetic, or unloading the bowels by a dose of the *compound jalap powder*, may prevent its accession or moderate the paroxysm.

PULMONARY PHTHISIS.

Natural History.—The lesions peculiar to pulmonary phthisis are those commencing with lobular induration of the lungs, ending in disintegration of the new material and of the textures involved in the induration and the formation of caverns, with or without the formation of miliary tubercles. The term "phthisis," as implying a condition of lung ready to disintegrate and to have cavities form in its substance, must no longer be regarded as having always a base of tubercle formation as its starting point; and the doctrine that pulmonary phthisis is always a constitutional disease—in the sense of Laennec—the result of a specific morbid product, arising from some peculiar diathesis or constitutional fault, and caused solely by the deposition of this substance, can no longer hold its own ground as an orthodox belief.

The nomenclature of the College of Physicians regards the subject of phthisis from two points of view, namely—(1.) *Phthisis* allied in its nature to scrofula, as a general constitutional disease, with or without tubercle; and (2.) as a destructive disintegration of the pulmonary tissue, having its source in *acute* or in *chronic* pneumonia.

The present position of our knowledge regarding the pathology of pulmonary phthisis shews that miliary tubercle, as a cause of phthisis, plays a very insignificant part in the process; while many processes tending to induration of the lungs, and their subsequent disintegration, give rise to phenomena which have been confounded under the common name of "tubercular phthisis." It has now been shewn that in a large number of cases in which death results from pulmonary phthisis, tubercles are not present in the lungs; and also that many lesions of the lungs have been mistaken for tubercle. Of the *pneumonic lesions which lead to pulmonary phthisis* there is no special or peculiar form; but the lesion is invariably a more or less prolonged lobular induration of the lung which undergoes the process of *tyrosis*, disintegration, and breaking down into cavities. Every form of pneumonia may thus leave a residue which, under certain circumstances, terminates in *tyrosis;* but some cases of pneumonia are more liable than others to leave products of inflammation behind; and instead of the material of consolidation in pneumonia being liquified and reabsorbed, it becomes more dense, and finally is transformed into the cheese-like substance (*tyrosis*) which finally breaks up into a cavity. Such a termination is rare in cases of common acute (croupous) pneumonia in a healthy person. It is more frequently met with in catarrhal pneumonia; and in chronic catarrhal pneumonia to find it is almost the rule. The following are the varieties of *pulmonary phthisis:*—

(*a.*) *Acute Pneumonic Phthisis.*—How far a recent acute pneumonic lesion must have proceeded, so as to be beyond the limits of complete restoration to the normal condition of pulmonary tissue, is not exactly determined. The condition of the patient as to general health and the soundness of his constitution influence the result. Hale and healthy subjects recover from an extensive pneumonic lesion, which persons of a scrofulous or cachectic constitution would not recover from; but how far lungs in a stage of grey hepatization can be recovered from, so that its tissue is completely restored, is not known. When there is actual induration and obliteration of the lobules, perfect repair and restoration cannot be expected. All that can be hoped for is that it may remain quiescent, without any retrogression towards the cheesy degeneration (*tyrosis*). Cases are constantly seen, *post-mortem*, in which gradual changes are obviously passing from red to grey hepatization, with well-marked granulation on the surface of a section, or to cheesy degeneration (*tyrosis*). Tuberculo-pneumonic phthisis is generally a rapidly fatal and common form of the disease, in which, although tubercles are present, the really efficient cause of destruction is the pulmonic inflammation, and its subsequent results in softening and cavern formation.

(*b.*) *Chronic Pneumonic Phthisis.*—Of this form there are two varieties, namely—(1.) That in which old indurations undergo a slow process of disintegration; and (2.) forms of disease in which an insidious inflammation proceeds very slowly to convert a considerable portion of pulmonary tissue into grey induration. But chronic pneumonic phthisis may be considered as the result of *chronic catarrhal pneumonia*, where the induration is of a gelatinous material, to which the names of "*tuberculous infiltration*," "*tubercular*" or "*cheesy pneumonia*," have also been given. The most frequent mode of the formation of cavities in chronic phthisis occurs in those cases where the absorbed material is replaced by a growth of connective tissue. The lung tissue does not again become permeable to air, but is transformed into a tough indurated substance. This connective tissue, by gradually shrinking, occupies less space, the thorax contracts, and the bronchi dilate into oblong round cavities (*bronchiæctasis*). One common form of pneumonic lesion which thus terminates is the fibroid or sclerosed lung. On section, it presents a smooth or a granulated surface. The interlobular connective tissue is very distinct, from its hyperplastic abundance, which divides and subdivides by innumerable ramifications, closing in minute polygonal spaces containing air-cells, and interspersed with much pigment; so that the cut section presents a bluish-grey colour of different shades of iron-grey granite-like appearance, or nearly black.

(*c.*) *Tuberculo-pneumonic Phthisis and Tubercular Phthisis.* "The greatest danger to most phthisical patients is the development of tubercles." It has been clearly shewn, alike by Addison and by Niemeyer, that patients suffering from *pulmonary phthisis* do not necessarily have miliary tubercles in their lungs at the commencement of their illness; but many become tuberculous during the course of the original lung-lesion as it progresses onwards to phthisical destruction and to cavern formation.

The general symptoms of pulmonary phthisis vary, therefore, according as to whether the case be one following *acute inflammation of the lung alone*, or of *tuberculo-pneumonic phthisis*, or of tuberculosis only; and the grounds on which the diagnosis of pulmonary phthisis may generally be made are the following:—

(1.) *Increased frequency of respiration*, not always attended with *dyspnœa*, without dulness on percussion, and without bronchial breathing. (2.) *Pains in the chest and shoulders* (often absent), described as dull, aching, "flying" pains about the collar-bones, or under one or both shoulder-blades. (3.) *Cough and expectoration precede pulmonary phthisis*, as a rule, by a longer or shorter time (two or three weeks), indicating a catarrh, which spreads to the alveoli as a catarrhal pneumonia. (4.) *Character of the sputa expectorated.*—(5.) *A tedious and troublesome cough*, with little expectoration, and with pyrexia, are not so suspicious symptoms of pulmonary phthisis as a pneumonic process with tubercles of the mucous membrane of the bronchial tubes and of the alveoli. (6.) *A hoarse or aphasic cough* signifies complication of pneumonic pulmonary phthisis with tubercle. (7.) *Increase of temperature.* (8.) *Impoverishment of blood and emaciation* are constant, and in relative proportion to the height and persistence of the fever. (9.) *The physical signs* indicate either (*a.*) Tuberculosis; or (*b.*) Inflammatory processes which have led to infiltration, cheesy degeneration (tyrosis), disintegration, with shrinking or destruction of lung-tissue; or (*c.*) both these conditions may be combined. The physical signs are of great importance, and a systematic examination of the patient is to be followed in every case; otherwise the diagnosis is a matter of extreme uncertainty to those unpractised in conducting a physical examination of the chest.

The physical signs of pulmonary phthisis, in the order of their relative frequency, may be stated as follows:—Dulness on percussion (constant); deficiency of respiratory murmur; bronchial voice; rough inspiration; expiration prolonged; mobility of chest-wall lessened; flattening of chest-wall; tubular quality of respiration; dry crepitation; wavy inspiratory sound. The physical signs denoting a few small scattered tubercles are—(*a.*) Inspiration rough and dry, and its intensity increased; (*b.*) expiration prolonged—compared with its normal intensity and duration, as eight to two; (*c.*) bronchophony in rare cases. Of indurations, and perhaps tubercle in groups or masses, the physical signs are:—Pulmonary crumpling sounds; dry crackling rhonchus; sonorous sibilant rhonchus, indicative of bronchial irritation; inspiration rough and dry, intensity increased; the intensity and duration of expiration increased, and its quality blowing; slight bronchophony; diminished local fremitus; slight dulness, localised and distinct; heart's sounds transmitted; and in certain cases a subclavian murmur. The relative frequency of the physical signs, commencing with the most frequent, are, mobility of chest-walls lessened; flattening of chest-walls; dulness on percussion; deficiency of respiratory murmur, rough inspiration; expiration prolonged; tubular quality of respiration; bronchial voice; dry crepitation; wavy inspiratory sound.

Acute Miliary Tuberculosis, or Primary Tubercular Phthisis, has also been named acute pulmonary consumption and "galloping consumption." It is expressed by febrile symptoms running an extremely rapid course, denoting the severity of the constitutional disturbance, and proving fatal in from twenty days to ten or twelve weeks. The disease occurs in two forms:—(1.) Connected with extensive infiltrations of pneumonic material in the lungs, with irregular softenings in the centre, or with small excavations surrounded by patches of fresh hepatization. (2.) That in which there is general diffusion through both lungs of semi-transparent grey granulations, combined with pneumonia in its first stage, bright arterial injection, or hepatization. The two forms may co-exist in the same lung.

Treatment.—If, unfortunately, a pulmonary catarrh does not abate, and a pneumonia does not resolve itself within the usual period, but catarrhal symptoms prevail in the apices, and pyrexia is persistent, with the severe disturbance of the general health which has been described, everything must be done to protect the patient from injurious influences. Further extension of the pneumonic process must be prevented by absolute rest in bed for a time, talking being forbidden, and coughing as much as possible repressed. The chest is to be covered with *poultices* from time to time. *Sinapisms*, *turpentine fomentations* or *blisters* are also frequently useful, and local bleeding may be required by *leeches*, if pleuritic pains exist. Whenever considerable pyrexia exists in the evening, all duty occupations should be given up, strict rest, equitable temperature, and application of poultices to the chest adopted, and moderate action of the skin maintained. Should the pyrexia still continue considerable, *digitalis* and *quinine* are the remedies most successful in reducing temperature in the following *formula:*—℞ *Pulv. herb. Digitalis*, gr. x.; *Pulv. rad. Ipecac.; Pulv. Opii. puri. a a.*, gr. v.; *Ext. Gentiani* q. s.; *misce et divide in pil.* xx. *One pill three times a day.* It is of advantage that *quinine* to the extent of gr. xx.

be added to this. Each pill will then contain *half a grain of digitalis*, *one quarter grain of opium*, *one quarter grain of ipecacuanha*, and *one grain of quinine*, which may be held in form by *glycerine* or *syrup*. (See also under *Catarrh* and *Pneumonia*.) The diet must be generally supporting and restorative. In the *chronic* form improvement of the digestive organs must be attempted by such remedies as the particular form of dyspepsia may suggest (see under Diseases of Digestive System). It is also very important that *cod liver oil* should be taken in cold weather, and winter months especially. The dose should be small—not more than a tea-spoonful once or twice, increasing to three times, a-day, —and it should never exceed a table-spoonful at any time. Tonics are constantly called for, especially the various preparations of *iron*, *mineral acids*, and *vegetable bitter infusions*. *Local applications* to the chest are useful from time to time, in the form of *small blisters* frequently repeated, *stimulant embrocations*, such as the *liniments* of *turpentine* and *acetic acid*; of *croton oil*, of *cantharides* (*liq. epispasticus*); of *chloroform*; or the *compound camphor liniment*. (See also page 207, *ante*.)

SECTION VII.—DISEASES OF THE PLEURA.

PLEURISY.

Natural History.—Inflammation of the serous membrane that lines the cavity and covers the viscera of the thorax is characterised at its outset by a febrile chill, followed by an acute sharp pain in some part of the chest, frequently called "*a stitch in the side*," usually confined to one spot about the lateral regions of the thorax. The acts of respiration are performed rapidly, and are not completed. A dry short cough supervenes, and the pulse is hard and quick. The natural serous secretion of the pleural sac is arrested in the first instance, but soon becomes increased in quantity, and of an inflammatory type, the exudation having a great tendency to assume the *corpuscular* character, when the effusion more or less rapidly increases, and may ultimately assume a sero-purulent character, the parietes of the corresponding side of the chest being dilated accordingly. With pleurisy as with pericarditis, there are at least two distinctive forms, namely—(*a*.) Where the pleura thickens, and the material of inflammation is of the adhesive kind; (*b*.) where the pleura also thickens, but the material of exudations, after pushing off the epithelium, continues to produce corpuscular forms by interstitial exudation, and leads to the accumulation of fluid within the cavity of the pleural sac. The following are common types of pleurisy: —(1.) *Cases in which no symptoms occur*, dry pleurisy, or pleurisy with purely nutritive exudation, characterised by extensive *adhesions.* (2.) *Cases in which the exudation is scanty but fibrinous.* (3.) *Pleurisy with abundant sero-fibrinous exudation*, involving the tissues of the parietal and costal pleura in very extensive lesions, and with effusion of serum into the pleural sac, equal in amount to two, three, and even ten, twelve, or more pounds of fluid. Like other inflammations, pleurisy may also be acute or chronic. The acute form may be preceded by fever, but often no such antecedent is present. Its local symptoms, however, in most cases, are strongly marked, the patient suffering with severe *continued pain* in the affected side, of "a dragging, shooting character," which is greatly exasperated by coughing or forced inspirations, movement, pressure, and percussion, so that the lungs can only be imperfectly filled with air. The seat of the pain, however extensive the inflammation, is generally limited to one point; and this point is usually about the centre of the mamma, or just below that part, towards the lateral attachments of the diaphragm. While the pain is constant, it nevertheless sometimes remits, and with the occurrence of effusion often totally disappears. It is often doubtful whether the pain is due to pleurisy, to rheumatism, to neuralgia, or to shingles. When the fibrinous effusion is scanty the pain is generally piercing when a "breath is fetched," and greater during ordinary than forced respiration. Coughing and sneezing are especially painful; and pressure from without or from within greatly increases the pain. Respiration is imperfectly carried out, and the body is bent towards the affected side. The tongue is commonly white, and the pulse varies.

The physical signs are delicately varied according to the anatomical conditions of the disease. At the most early stage, when the serous secretion is at first arrested, the expansion of the walls of the chest is diminished, as may be proved by measurement. The percussion-sound, however, is not perceptibly altered, and respiration is weak, because imperfectly performed. The characteristic *friction-sound* of inflamed serous membranes may, perhaps, now be detected, if listened for in the *infra-mammary* or *infra-axillary* regions. When the secretion has returned, increased in quantity, the signs continue as described; but the clearness of the percussion-sound becomes diminished, and the *friction-sound* is of a rubbing or grating character. The patient sometimes experiences a distinct sensation of friction. The period of inflammatory effusion is now established, and the infra-mammary and infra-axillary regions become more or less bulging; the projection of the intercostal spaces of the affected side during both respiratory acts becomes most obvious; the thoracic vibration from the voice is abolished where the fluid intervenes, and so also are friction-murmurs there. The area of dulness, and of the peculiar sounds, may be changed by altering the position of the patient. The natural respiratory murmurs become greatly intensified above the level of the effusion. When the effusion exists on the right side, the sounds of the heart are more clearly audible than in the natural state in the right axillary region, because the lung is more solidified by the pressure of the effused fluid.

Pleuritic inflammation sometimes terminates in suppuration (*empyema*). Empyema may be true or false; it is said to be true when the pus is secreted by the pleura, and false when it results from the bursting of an abscess of the lung into the cavity of the chest (*pyothorax*). The quality of the pus in true empyema varies from a genuine laudable pus to a sero-purulent fluid. In quantity, also, it varies from a few ounces to many quarts, filling the entire cavity of the chest. Under these latter circumstances the side of the chest is dilated, and the intercostal spaces are widely separated and bulging. *A collection of air or gas in the cavity of the pleura may also co-exist with fluid in the same cavity. The condition is sometimes termed* hydro-pneumothorax; which occurs under any of the following conditions:—1. When no communication exists between the pleura and the external air, it is then presumed to be due either to the spontaneous evolution of gas from decomposing fluid in the pleura, from gangrene of the pleural membrane, or from the secretion, generation, or exhalation of air from the pleura—a phenomenon of doubtful occurrence *per se*. 2. When a communication takes place between the pleura and the alimentary canal, as in cases of softening and perforation of the œsophagus or stomach. 3. When a communication occurs between the pleura and the atmosphere, through an opening in the chest-wall, the result of penetrating wounds of the thorax or of parietal abscess. 4. When a communication occurs between the pleura and the bronchi; either the *result of violence*, rupturing the lung-substance, and tearing the pulmonary pleura; or the *result of disease*, causing perforation of the pulmonary pleura from without inwards, as in cases of *empyema;* or from within outwards, by ulceration. Such ulceration may be due to *tuberculous disease*, to *hydatid cysts*, *cancerous growths*, *pneumonic gangrene*, *metastatic abscess* or *bronchial gland abscess;* or, lastly, the lesion may be the consequence of *emphysema*, or *pulmonary apoplexy*, or minute bronchial abscesses perforating the lung during the course of typhoid fever. Numerous cases of pneumothorax are to be met with from the bursting of a pulmonary cavity—during inspiration; or from the opening of a pleural effusion into the lung. Indeed, tubercular ulceration of the pulmonary pleura is the efficient cause of pneumothorax in 90 per cent. of the cases in which air is found in the pleura.

Treatment.—General blood-letting may be imperatively demanded in some acute cases under the circumstances mentioned at page 78, *ante.* And if at the commencement of an acute attack, whether general blood-letting has been required or not, the use of cold compresses and of local blood-letting by leeches or cupping do not relieve the pain and the dyspnœa within two or three hours, the method recommended by Dr. Frederick T. Roberts, in his excellent *Handbook of Medicine* (page 508), of *mechanically fixing the side affected, so as to prevent its movements* as much as possible, ought to be at once adopted. "Strips of some properly adherent plaster, spread on a firm material, are cut about four inches wide, and sufficiently long to extend round the side from mid-spine to mid-sternum, or a little beyond. These are laid on over a variable extent of the chest, according to the severity of the case, it being sometimes requisite to include the whole side—*beginning below.* The patient is directed to EX-*pire* deeply, and at this time a strip of the plaster is fixed at mid-spine, and drawn tightly round the side *in the direction of the ribs;* then another strip is laid on over this, in the same way, *but across the course of the ribs;* the third follows *the direction of the first, overlapping about half its width;* the fourth that of the second, and so on in alternate directions. A strip may also be passed over the shoulder and kept down by another fixed round the side across its ends." *Tartar emetic* contributes powerfully to subdue the inflammatory condition; but when the pain in the side and fever have ceased, it is no longer necessary. *Digitalis* may be given in recent cases in the form of *infusion;* but in the more latent cases *one grain* of the *powder of the leaves* combined with a grain of *quinine. Opium*, in the form of *Dover's powder*, is of great use. *Blisters* are not to be used until the acute stage is past; but when the pain has ceased for some days, and absorption of the fluid proceeds slowly, and the disease promises to become chronic, a succession of blisters (flying blisters) may be applied. *Diuresis* should also be promoted and the bowels kept freely opened. If *dyspnœa* is so urgent as to threaten life, and the quantity of fluid is so large as to fill one pleura and compress the sound side, then *paracentesis thoracis* must be at once performed; or if the fluid is found by the exploring needle to be pus, or if progressive absorption is not completed within a month, and if the fluid still occupies as much as half a pleural cavity, it must be let out.

CHAPTER XIII.

DISEASES OF THE ABDOMINAL VISCERA AND OF THE PERIPHERAL PARTS CONNECTED WITH THEM.

SECTION I.—GUIDE TO THE DIAGNOSIS OF DISEASES OF THE ABDOMINAL VISCERA.

Regions of the Abdomen.—The abdomen, like the thorax, is usually divided into regions by five vertical lines, namely—(1.) From the insertion of Porpart's ligament in the external tubercle of the pubes to the acromial extremity of the clavicle (right and left side); (2.) from the posterior border of the axilla (the inferior edge of *latissimus dorsi*) to that point of the crest of the ilium on which it falls vertically (right and left side); (3.) along the spinous processes of the vertebræ from the sacrum to the nape of the neck; and by four transverse lines which indicate horizontal planes, as follow:—(1.) On the point of the xyphoid cartilage; (2.) on the last short ribs; (3.) on the anterior superior spinous process of the ilium on each side; (4.) on the upper margin of the *os pubis.* These four horizontal and five vertical bands map out the abdominal walls into *thirteen* regions, of which five are anterior, four are lateral (two on each side), and four are posterior. They are named as follow:—*Anterior regions* are *epigastric*, *umbilical*, *hypogastric*, right and left *inguinal.* The *lateral regions* comprehend the right and left *hypochondriac*, the right and left *iliac.* The *posterior regions* embrace the *inferior dorsal* on the right and left, the right and left *lumbar.*

The best idea of the contents of these regions is obtained by defining first the limits of the *liver.* It fills the right *hypochondriac* region, filling up the concavity of the diaphragm; and it is almost completely concealed by the arch of the ribs. A part of the left lobe projects into the *epigastric* region and *left hypochondriac.* It also projects upwards into the *infra-axillary* region of the thorax, where it is separated from the thoracic wall by the thin lower margin of the right lung. Its upper margin in this space is on a line nearly with the level of the nipple, about the fifth intercostal space—less frequently beneath the fifth rib. In the perpendicular axillary line its margin is about the *seventh* intercostal space—more seldom under the seventh rib: close to the vertebral column its margin is in the tenth intercostal space—less frequently in the ninth. At the median line the upper boundary of the liver cannot usually be distinguished from the lower margin of the heart. It is best made out by drawing a straight line from the point of contact of the right margin of the cardiac dulness with the upper boundary of the liver to the apex of the cardiac dulness on the left. In the epigastric and left hypochondriac regions lies the stomach. The umbilical region is crossed by the transverse colon, passing from right to left a little above the umbilicus. The convolutions of the jejunum and ileum occupy the umbilical and hypogastric regions. The large intestines surrounding the convolutions of the lesser intestines occupy the iliac and lumbar regions on each side. The kidneys are equally shared between the *infra-scapular* and the inferior dorsal regions. The spleen in its greater bulk is in the same region on the left side.

The Methods of Exploring the Abdomen are principally three—namely, *inspection*, *manual examination* (*palpation*), and *percussion*.

Inspection furnishes information relative to *size*, *form*, and *movement;* and such information ought always to be acquired when the chest as well as the abdomen are both exposed simultaneously in a good light, the patient being protected from cold by a previous regulation of temperature in a room suited for the purpose of such an examination. The eyes of the patient ought to be directed away from the examiner. *Palpation* furnishes information relative to position, size, consistence, elasticity, spontaneous movement, or mobility, and the presence of vibrations which may reach the surface. Care should be taken that the hand, when applied, should not be cold. *Percussion* furnishes information relative to the comparative solidity of regions, and thereby indicates the kind of organ or material immediately below the seat of percussion. The chief objects to be held in view in exploration of the abdomen are the following:—To ascertain (1.) its form and size; (2.) its degree of tension or solidity; (3.) its temperature; (4.) sensibility or tenderness over any part; (5.) the presence or absence of tumor in or amongst the viscera; (6.) the presence or absence of fluids in the peritoneal sac; (7.) the nature and extent of the intestinal contents. Percussion after a meal is to be avoided, and it may be necessary to remove obstinate constipation or gaseous accumulation by a free purgation. (For further details see pages 16 to 23, *ante*).

SECTION II.—DISEASES OF THE PERIPHERAL PARTS OF THE DIGESTIVE SYSTEM IN CONNECTION WITH THE ABDOMINAL ORGANS.

The signs of disease, from an examination of these parts, having been already fully indicated at pages 16 to 23, the substantive diseases of the *mouth*, *tongue*, *pharynx*, and *œsophagus* are here very shortly noticed.

(*a.*)—*Diseases of the Mouth.*

STOMATITIS.

Natural History.—The mouth, especially in children, is liable to various forms of inflammation, which are named *simple*, *ulcerative* or *vesicular stomatitis.* The *simple* or *erythematous inflammation* is generally due to irritation, such as scalds, cold, tartar on the teeth, or gastric derangement. *Ulcerative stomatitis*, in its milder form (*noma*), commences at the edges of the gums, opposite the incisor of the lower jaw, by white spots on the gums, which appear spongy and separated from the teeth. Ulceration may then begin and extend along the gums till the jaws are implicated; and as the disease advances, the cheeks and lips begin to swell, the teeth fall out, and the gums becoming gangrenous, the breath becomes fetid (*cancrum oris*), and there is generally enlargement, with tenderness of the submaxillary glands. *Thrush*, *aphtha*, or *vesicular stomatitis* commences like simple *stomatitis*, but spreading ulcers form after each vesicle, and the secretions of the mouth are greatly altered and increased. The adjacent glands become tumid and tender. Diarrhœa may come on and prove fatal to infants, and the evacuations are very offensive.

Treatment.—In simple stomatitis small doses of *magnesia*, or of *rhubarb* and *soda*, with or without *calumba*, will generally correct stomach derangement and cure the disease. In the severer forms the mouth ought to be frequently washed out with such emollient fluids as *linseed infusion*, *dilute glycerine*, *biborate* of *soda* mixed with *honey;* or with the *linseed* or *glycerine fluids*, *creosote*, *vinegar*, *carbolic acid*, and *alcohol* are also useful applications. In the most severe cases, such as of *cancrum oris*, *chlorate of potash* ought to be given internally, to the extent of five grains every four or six hours; and the *solution of the pernitrate of iron* internally is also of service. When parasitic thrush prevails, the application of a solution of *sulphate of soda* (*f* ʒ i. to *f* ℥ i. of water) removes the lesion in 24 hours. A change of air is often absolutely necessary to convalescence, with the use of *arsenic* and *iodine*, and good food, to rectify the faulty nutrition of the child.

(*b.*)—*Diseases of the Tongue.*

ULCER OF THE TONGUE.

Natural History.—Inflammation, simple or specific, terminating in chronic ulceration, is the most frequent affection of this organ, in one or other of the following forms:—(*a.*) *Simple ulceration;* (*b.*) *syphilitic and mercurial ulceration;* (*c.*) *cancerous ulceration.*

The *treatment* of syphilitic ulcerations of the tongue varies according to the severity and form of the affection. In the secondary varieties local application of solutions of *chloride of zinc*, with washes of *chlorate* or *permanganate of potash*, are frequently sufficient; but sometimes the application of *solid nitrate of silver* is required, and the internal use of *grey powder.* In the tertiary forms of syphilitic ulceration, *solid nitrate of silver* must be applied daily, and large doses of *iodide of potassium* frequently administered. In mercurial ulcers, constitutional treatment of a tonic character, *disinfectant gargles*, and *generous diet* are indicated.

(*c.*)—*Diseases of the Fauces, Pharynx, and Œsophagus.*

QUINSY—*Syn.*, CYNANCHE TONSILARIS.

Natural History.—Acute inflammation of the tonsils, which may or may not lead to suppuration, is known by the name of *quinsy.* Exposure to cold is almost always the cause of the attack; but in some cases it appears to be due to constitutional disturbance. Some people are much more liable to quinsy than others; and a patient who has had one attack rarely escapes a second. In adults enlarged tonsils commonly predispose to the affection; and there is almost invariably some disease of the follicles of the tonsils. Spring and autumn are the periods of the year in which the affection most frequently appears. It is rare in children, and is seldom met with before puberty, and appears to be a disorder mainly confined to youth and middle life. Inflammation of the tonsils is usually preceded by some shivering and fever, succeeded in a few hours by the sensation of a sore throat. The symptoms increase in severity and with great rapidity. The patient experiences great pain in deglutition, and on attempting to swallow, drink is ejected through the nostrils. There is a continual dull aching when the throat is at rest; the voice is altered, being thick and nasal, and the patient can hardly breathe except through his nose. He may have earache, and frequently is somewhat deaf.

There is a constant flow of saliva from the half-open mouth, and there is a frequent desire to clear the throat of the viscid mucus which adheres to it. These symptoms, combined with feverishness and loss of appetite, increase in severity, until either resolution takes place or pus, having been formed, escapes. The degree of prostration which attends tonsilitis is usually out of all proportion to the severity of the local lesion. The attack generally subsides in a week or ten days, and rarely lasts a fortnight.

Treatment.—In the early period of an attack resolution may almost invariably be brought about by the administration of *guaiacum*, in the form of lozenges, containing three grains of the *extract of guaiacum* mixed with *black currant paste*, every two or three hours. Even when the tonsils are considerably enlarged, the *gum resin of guaiacum* is of great service, combined in the following formula:—℞. *Magnes. Sulph.* ʒvi.; *solve in aquæ* ℥viii.; *Adde Pulv. Guaiaci*, ʒiss.; *Pulv. Gum Tragacanth Co.*, ℈ii.; *misce bene.* One-sixth part of this mixture may be given every four hours till the bowels are freely moved. A mixture of mucilage or gruel, containing *nitrate of potash* or *borate of soda*, and a small quantity of *syrup of poppy*, *Batley's solution of opium*, or *Prussic acid*, should be frequently but slowly swallowed in small quantities—in tea or table-spoonfuls, *the amount of narcotic ingredient being carefully regulated*, so that a definite quantity be consumed in a given time. Externally, a *mustard poultice* should be applied, and afterwards *linseed poultices.* If suppuration has commenced great relief will be afforded by puncturing the abscess with a guarded knife,—*the incision should always be made towards the median line.* In cases of sloughing sore throat, a stimulating and tonic treatment must be pursued. Tincture of the *perchloride of iron* and *chlorate of potash* are the most suitable internal remedies. Disinfecting gargles of *carbolic acid* or *permanganate of potash* are not only agreeable to the patient, but very useful in checking the offensive discharges.

PHARYNGITIS.

Natural History.—Inflammation of the textures of the pharynx may be either *acute*, *sub-acute*, or *chronic*. *Acute pharyngitis* is generally met with in association with a similar condition of the fauces, and is very rarely seen alone. The form of inflammation is most frequently œdematous, occasionally extending to the larynx, and hence its danger. The symptoms are, great pain and difficulty of swallowing, with more or less dyspnœa if the swelling extends over the windpipe; when the larynx is affected the symptoms are those of œdematous laryngitis, and with the laryngoscope, that part of the pharynx which can be seen will appear red and œdematous.

Chronic pharyngitis is of three forms,—(1.) *Granular;* (2.) *follicular;* and (3.) *herpetic.*

Treatment should consist in *hot steam inhalations* of a sedative character, *poultices externally*, and *scarification if œdema* takes place. In those cases in which the uvula is much swollen and infiltrated with serum, it should be at once removed. *Tonics*, such as *iron*, *quinine*, and *strychnia* are mainly indicated. Locally, in the *granular* form, *astringent solutions*, such as *zinc* and *iron*, may be applied either with the brush or in the form of an *atomized inhalation. Gargles* are of no use when the disease is situated behind the anterior pillars of the fauces; but *lozenges* are most serviceable in all forms of pharyngeal disease. Those of *tannin*, *rhatany*, and *kino* are very beneficial in granular pharyngitis. In *follicular pharyngitis* the spots should be scraped, the secretion emptied, and solid *nitrate of silver* applied to each diseased follicle. Lozenges of *chlorate of potash* and of *bitartrate of potash* are useful in stimulating the follicular secretion to a healthy condition. In *herpetic pharyngitis* the raised papules must be destroyed by equal parts of *caustic*, *soda*, and *unslaked lime*, which is mixed with water, as required, into a creamy paste, which should be applied to each papule with a finely-pointed glass or aluminum rod. The caustic effect of this application is instantaneous. The patient should therefore be always directed to wash his mouth with water immediately after the application, so as to prevent any other part of the throat being burnt by contact with the caustic. In all cases of pharyngeal disease, every form of spice, pepper, mustard, and piquant food should be strictly prohibited, and all fluids should be taken at a moderate temperature.

ŒSOPHAGITIS.

Natural History.—Inflammation of the œsophagus is a rare disease. Morbid poisons seem to have little influence over this portion of the alimentary canal. The most frequent causes of its inflammation are, accidentally drinking boiling water; swallowing corrosive liquids, such as the mineral acids; and wounds, most commonly inflicted in the act of committing suicide. Children a few days old are sometimes affected with slight inflammatory affections of the œsophagus. In new-born children points of lymph may be found lying on the mucous membrane of the œsophagus, and apparently an extension of *thrush* affecting the mouth and pharynx Ulcers in general form on the anterior portion of the œsophagus; and by continued extension they at last penetrate the posterior surface of the larynx, so that the patient may die suffocated from the escape of food into the lungs. Occasionally the ulceration takes place from without inwards. The cicatrices or the careless use of a probang are apt to induce stricture. The symptoms of *œsophagitis* are almost entirely local, and consist principally of pain, dysphagia, the expectoration of a thick viscid mucus, and vomiting. Emaciation follows the loss of nutrition, and the patient ultimately dies from inanition. Auscultation of the œsophagus, along the left edge of the vertebral column, may help to detect the site of disease.

The *treatment* of *œsophagitis* is by small *local bleedings*, *warm cataplasms* to the neck, and by moderately acting on the bowels. When the case is hopeless, from the small quantity of aliment which reaches the stomach, life may yet be prolonged by enemata of soups, milk, egg, wine, or other nutritious fluid matters, and œsophagotomy may be necessary.

SECTION III.—DISEASES OF THE CENTRAL PARTS OF THE DIGESTIVE SYSTEM OR ABDOMINAL VISCERA.

(*a.*)—*Diseases of the Stomach.*

GASTRITIS.

Natural History.—Idiopathic gastritis is rare; but forms of inflammation, tending to exudations and destruction of parts, or condensations of tissue, especially about the pyloric orifice of the stomach, are generally the consequence of direct injury from irritant or corrosive poisons, and especially the use of raw spirits. The simplest and most frequent form of inflammation of the stomach is characterised by active congestion and an excessive secretion of mucus—a condition known under the name of *gastric catarrh*, similar in character to that of the air-passages. It may be either *acute* or *chronic*. In the acute form the mucous surface is reddened in spots by a fine injection, its tissue relaxed, and its surface covered by a layer of tough mucus. There are also certain morbid states of the stomach, resulting out of forms of inflammation, expressed by—(a.) *Softening of tissue;* (b.) *glandular degeneration of the proper mucous substance;* (c.) *congestion.* The symptoms of abnormal states of the stomach express themselves by—(1.) Vomiting, associated often with lesions of other organs; (2.) deficient secretion of gastric juice; (3.) fermentive processes (alcoholic, butyric, or lactic), tending to the development of entophytes, such as sarcinæ; (4.) indigestion, associated with and depending upon—(*a.*) Morbid states of those viscera which are conjoined with the stomach in the processes of digestion, such as the liver, pancreas, and small intestines; (*b.*) imperfect action of the kidneys, as in Bright's disease; (*c.*) defective or diminished morphological changes during the processes of nutrition in the tissues, generally expressed by altered secretions and excretions, as in many constitutional diseases; (*d.*) indigestion, associated with pyrosis and increased secretion of the juices of the stomach and salivary glands, and with cutaneous disorders, such as urticaria; (*e.*) indigestion, associated with drunken habits. The diseases of the stomach with which one or more of these organic or functional states may be associated are,—*Gastric catarrh* and *gastritis*, *chronic ulcer*, *hæmatemesis*, *perforation*, *dilatation*, *stricture*, *gastric fistula*, *hernia*, *cancer*, *colloid tumors* (non-malignant), *sarcinæ*, *injuries*, *laceration*, *dyspepsia*, *gastrodynia*, *pyrosis.* The symptoms of *gastric catarrh* usually take the form of what is commonly called a "*disordered stomach*," expressed by headache, especially across the forehead, increased on stooping, and then associated with flashes before the eyes, and a sensation of tightness, as if the head would burst. Nausea and sickness exist, with sensations of heat and of cold, distaste for food, the sight or smell of which is apt to produce sickness, retching, and vomiting. The food already in the stomach undergoes an abnormal decomposition; lactic and butyric and acetic acids are produced, and fetid gases are set free by these fermentive processes. Eructations into the mouth of sour and rancid matters are also common. The tongue is generally coated with a white creamy fur; the odour of the breath is offensive, the mouth feels clammy, and the taste is bad. *Gastritis* from poisoning causes general depression, so great in some cases as to simulate perforation. The pain generally spreads from the epigastrium over the abdomen, and is accompanied with vomiting of mucus or of bloody mucus, which may be followed by purging of similar evacuations, preceded by severe colicky pains, and followed by collapse, small pulse, cold skin, and clammy sweat.

Treatment.—Emetics are required in cases where the stomach has been overloaded; and it is certain, from the gases and fluids causing prominence over the stomach, that it contains decomposing food. One scruple of *ipecacuanha*, with one grain of *tartrate of antimony*, is the safest and most efficient emetic. When injurious matters have passed into the bowels, causing flatulence and colicky pains, mild laxatives may be required, such as *rhubarb*, or *compound infusion* or *mixture of senna*, or *fluid magnesia*, in small doses, may be given every hour or two hours, followed by five to ten grain doses of *bicarbonate of soda.* In cases of *acute gastritis*, mercurial purgatives by *calomel* are of great service.

Three to five grains may be given to an adult, followed by a dose of *castor oil* or the *compound senna mixture* of the pharmaeopœia. Where it is not desirable to act so searchingly on the small intestines, *blue pill*, with *compound colocynth* or *rhubarb pill* used in equal parts (*a a* gr. ii.), combined with one grain of *ipecacuanha powder*, is a mild and gentle laxative. *Iced water* to drink in small quantities, or small pieces of ice in the mouth, tends to allay thirst, and to relieve pain; and the continuous use of hot-water fomentations over the region of the stomach, as hot as the patient can bear them, are of great benefit.

CHRONIC ULCER OF THE STOMACH.

Natural History.—Simple, *chronic*, and *perforating* ulcers of the stomach occur. The ulcer is generally solitary and deep, seldom larger than a shilling, circular or oval in shape, its edges clean, sharp, and well defined, as if punched out. It is generally situated along or near the lesser curvature, and usually nearer the pyloric than the cardiac orifice, and more frequently on the posterior than the anterior wall. It is more common in women than in men, nearly in the proportion of two to one. It is especially a disease of middle and advanced life. It is relatively more frequent amongst the poor than amongst the rich; and it is especially found in maid-servants between the ages of eighteen and twenty-five. It tends to prove fatal by—(1.) *Perforation;* (2.) *hæmorrhage;* (3.) *exhaustion. The symptoms* are mainly disturbance of gastric digestion with pain. The character of the pain is peculiar, at first being little more than a feeling of weight or tightness, of a dull character, and continuous. It gradually becomes intensified into a burning or gnawing sensation, which produces a kind of sickening depression. It generally comes on from two to ten minutes after the ingestion of food, and remains during one or two hours, corresponding to the period of gastric digestion, after which it gradually subsides; or, if vomiting empties the stomach, it also invariably ceases.

Treatment.—For obvious reasons ulcers are most difficult to heal, and are to be treated by rest to the stomach, and by dietetic rather than by medicinal means. The patient must eat in small quantities, especially of *milk* thickened with *arrow-root*, *macaroni*, *semolina*, *sago*, *tapioca*, *biscuit powder*, *Indian meal*, or *oatmeal gruel*. *Iced milk*, combined with one-quarter to one-third of *lime-water*, is particularly recommended—two or three table-spoonfuls of which are to be taken at short intervals, so that about two quarts of milk may be thus used during the day, rendering regular and more bulky meals unnecessary. The lime-water tends to prevent coagulation of the milk, and the milk thereby more readily passes unaltered into the intestines, to be digested by them rather than by the stomach. Perfect quiet in the recumbent posture must be observed, the lips and tongue being moistened from time to time by a little water. The patient may thus be kept for eight or nine days, or even longer, on nutrient enemata alone, when the pain, the irritability of stomach and of the system will cease. The substances most useful for enemata are *milk*, *strong unsalted beef-tea*, *raw eggs beaten up in milk*, occasionally a little *brandy*, and generally in two enemata daily ten or twenty minims of *tincture of opium.* The enemata should be as small as possible, from two to six ounces only at a time. The interval to the stomach thus gained of complete rest is of the greatest importance towards success in the treatment of gastric ulcer, and, combined with the restricted diet described, will usually effect a cure in three weeks. Vomiting may be relieved by *dilute hydrocyanic acid* (five minims), combined with *bicarbonate of soda* (twenty or thirty grains) in solution, repeated every two or three hours; or also, *hypophosphite of soda.* The *subnitrate of bismuth*, in doses of ten to twenty grains every six or eight hours, alone or combined with five to ten grains of *compound powder of kino*, has a remarkable effect in relieving pain, vomiting, and diarrhœa.

Hæmatemesis.

Natural History.—A discharge of blood from the stomach or hæmatemesis is generally a consequence of ulceration of an artery or vein; and sudden death may result from such ulceration of the stomach opening into several blood-vessels. The chief difficulty in the recognition of hæmatemesis is to distinguish it from hæmoptysis; but the burning heat of the stomach, the black pitchy stools, the absence of cough, and of the signs furnished by auscultation, aid the diagnosis. The colour of the blood from the stomach, likewise, is generally black, dark, clotted; and the blood may be mixed with food, the coagula containing no air, being generally acid in reaction; while that from the lungs is more commonly arterial, bright red, frothy, and mixed with mucus; not coagulated, and if so, the coagulum generally contains air, and is in re-action alkaline. The quantity is also in general greater from the former than the latter viscus, although there are many exceptions to this rule.

The treatment of the acute forms of hæmatemesis is similar in many respects to that of *hæmoptysis.* In cases of *hæmatemesis* from *cirrhosis*, or other obstruction to the circulation through the liver, and in the vicarious hæmatemesis of women, *leeches* to the anal region or *os uteri* are of service. The action of *ice*, by swallowing small pieces from time to time, is very beneficial, covering at the same time the epigastric region with ice-cold compresses, which require to be renewed frequently. Solutions of *dilute* or *aromatic sulphuric acid*, in doses of ten to twenty minims, or of *alum*, are of service. *Alum* may be given in doses of eight to twelve grains, combined with Batley's solution of *opium*, or with *laudanum*, or with *sulphuric acid.* In *chronic hæmatemesis*, *gallic acid* is recommended. Solution of *pernitrate of iron*, in doses of thirty to forty minims, may also be of use. *Ergot* may also be of service. *Tannin* is one of the best astringents in the form of a pill—three to six grains twice or thrice a day. The patient must maintain absolute rest in bed, and must not rise to stool.

DYSPEPSIA.

Natural History.—This condition is regarded as an abnormal functional difficulty rather than a disease, due—*First*, to sympathetic relations with other organs, themselves in a morbid state, and explained by the phenomena of "*reflex action*,"—*e.g.*, *nausea*, and sometimes *vomiting*, which attends irritation of the *lung*, *brain*, *liver*, or *uterus*. *Second*, to a scanty secretion of the gastric juice. This difficulty of digestion is characterised by slowness and long retention of food by the stomach; prolonged distress after eating, especially weight and uneasiness at the pit of the stomach; tendency to decomposition of food in the alimentary canal; the evolution of fetid gases; and the appearance of unaltered ingesta in the stools. Gastric digestion should occupy, on an average, from two to three hours. Dyspepsia is often an inheritance by birth, and the conditions which tend to impair digestion are, especially, mental over-exertion, prolonged anxiety, especially after meals, gluttony, drunkenness, sedentary habits, the consumption of more food than the system requires, and alcoholic stimulants. *Third*, to the abnormal quality of the gastric juice, or diminished movements of the stomach, so that the ingesta are not sufficiently mixed with the gastric juice. *Cardialgia* is the name of the characteristic symptom of this condition—namely, pain at the orifice of the stomach. It is also sometimes termed *heartburn*, or *pyrosis*, or *water-brash.* Tobacco also has a poisonous principle which greatly favours dyspepsia, and many persons suffer severely after smoking a few cigars or even one. Dyspepsia of liquids also causes great uneasiness; and on vibration of the stomach the fluid may be heard splashing about in it—the stomach being generally distended to an abnormal extent.

Treatment.—When *congestion* exists, a sparing and easily digested diet and total abstinence from fermented drinks are imperatively demanded. When catarrhal inflammation prevails, the blandest food must be given in very small quantities; and in severe cases leeches are to be applied over the region of the stomach, and iced water, or small pieces of ice, taken occasionally to relieve the thirst. The necessity is absolute of a regulated diet in all cases of impaired digestion. If fulness and uneasy sensations are experienced after dinner, less food should be taken at that meal, and more at breakfast; the principle being to apportion the amount of food more evenly over the waking hours than is commonly done. In cases of slow digestion, with deficient secretion of the gastric juice, the rules of treatment are—(1.) To let albuminoid food be as liquid as possible—eggs, therefore, must be eaten when cooked short of coagulation of the albumen; (2.) to let the day's allowance of food be taken in small quantities at regular intervals; (3.) that by the administration of alkalies the food may pass to the intestines, and be digested there, rather than by the stomach.

(b.)—*Diseases of the Intestines.*

ENTERITIS.

Natural History.—Inflammation of the small intestines, or *enteritis*, is a rare disease, and seldom affects the intestine throughout its whole extent. The peculiarities of anatomical organization, such as the various forms of minute glandular parts, determine in some measure the forms of enteritis. With some modifications, the *organic* lesions of the lesser intestinal tract are in many respects precisely similar to those described in the stomach; while the functional disorders are indicated by the various forms in which the intestines express irritation or perverted action, such as by *spasms*, *colic*, *flatulence*, *indigestion*, *constipation*, and *fluxes*, *diarrhœa*, or *catarrh*. Chronic catarrh is the most common, and is generally the result of one or other of the following conditions:—(1.) Obstruction to the hepatic circulation, and especially to the escape of the blood from the portal vein. (2.) Lesions of the respiratory and circulatory organs, which cause obstruction to the emptying of the *vena cava*. (3.) Disturbance to the external circulation, such as accompanies severe inflammations of the skin, as from burns, or from sudden exposure of the skin to low temperatures, as by travelling in cold weather. (4.) Peritonitis. (5.) Mental excitement. (6.) Local irritations from the use of purgatives; of some kinds of vegetable food; the passage of undigested decomposing substances from the stomach into the intestines; or the retention of fæcal masses. (7.) Lardaceous disease of the intestine, of septicæmia, and of cholera (simple and malignant). The *symptoms* of enteritis are—diarrhœa, combined with pain, aggravated by pressure. The chief seat of pain is generally about the umbilicus, or the right iliac fossa. The discharges from the bowels relieve for the moment the griping pains. The pulse is excited, and generally full and strong, with pyrexia.

The treatment of *enteritis* and *intestinal catarrh*, when not arising from a morbid poison, is by gentle purgative medicines combined with an *opiate*, *fomentations*, and *purgative* or *opiated enemata.* After the inflammation has subsided, mild tonics, as the *compound tincture of gentian*, with *nitro-muriatic acid*, may be substituted. When catarrhal diarrhœa exists, with congestion connected with hepatic difficulty, a cathartic dose of *calomel*, followed by *castor oil*, may be necessary, or *magnesia.* Next to those remedies are diaphoretics; and for this purpose combinations of *Dover's* with *James's powder*, or a *solution of tartar emetic* with *laudanum*, are the most useful medicines, aided by the use of the warm bath, and a flannel roller applied with firmness round the abdomen. Where hyperæmia is excessive, and accompanied by moderate transudation from the intestine, cold external applications are suitable, as well as in the severer forms of catarrhal enteritis, as after extensive burns accompanied by great pain. The best mode of using such cold appliances is by cloths wrung out of cold water and laid over the abdomen, and covered with a dry cloth. In the chronic form of intestinal catarrh, particularly those combined with obstruction, irritating and warm compresses are most suitable.

TYPHLITIS.

Natural History.—Collections of fæces in the cœcum and ascending colon, or of fæcal matter composed of such crude accumulations as the skins or stones of fruit, portions of unripe fruit or uncooked vegetable substances, intestinal concretions, balls of lumbrici, may be the first beginnings of cœcal inflammation, which often leads to ulceration of the mucous membrane, and not unfrequently of the entire wall of the bowel, preceded by repeated attacks of colic and catarrh, with stomach-ache and alternate constipation and diarrhœa. The muscular coat becomes paralysed, and is unable to propel onwards the fæcal contents. Mucus or bloody mucus passes by the rectum, the result of catarrh; but no proper evacuation is obtained. Scybalæ tend to accumulate throughout the saccular pouches of the large intestine; and dilatation, with paralysis of the bowel, extends along the gut. In most cases there are severe pains in the right iliac region, and characteristic fæcal tumors, which generally take the position and assume the shape of the cœcum and ascending colon, and may extend from the right iliac fossa towards the lower margin of the ribs. Pain is increased by pressure and motion, and is marked by severe exacerbations, with intervals of comparative ease. In some cases the inflammation extends to the peritoneum of the adjoining intestine and abdominal wall, as well as to the connective tissue which unites the ascending colon behind to the iliac fascia (*perityphlitis*). There may then be pains in the right thigh, and the psoas and iliacus muscles being infiltrated, they are unable to contract or the patient to raise his thigh. All these symptoms, although severe, may pass away after several masses of badly smelling fæces have been expelled. On the other hand, the disease may be fatal by peritonitis, or by the formation of a fæcal abscess in the right iliac region.

Treatment.—A full dose of *castor oil* (ʒss. to ℥i.) is indicated if vomiting does not exist. Drastic purgation is not to be thought of. The use of enemas through long rectum tubes are the most efficient means of relief, which may throw up four or five pints of liquid in a continuous stream, so as to soften, crumble down, and set in motion the fæcal collections. *Salt*, *castor oil*, or *turpentine*, or *milk* ought to be added to the fluid injected. Leeches may be required if pain on pressure persists in the iliac region.

DYSENTERY.

Natural History.—An infectious febrile disease, accompanied by tormina, followed by straining, and scanty mucus or bloody stools, which contain little or no fæcal matter. The minute lenticular and tubular glands of the mucous membrane of the large intestines, with the intertubular connective tissue, are the chief seats of the local lesion, which sometimes extends into the small intestine beyond the ileo-colic valve; especially in cases in which *scorbutus* is a predisposing cause. Dysentery is a most formidable disease, on account of its oftentimes insidious nature, from its tendency to recur, and from the after influences it exerts on particular organs and on the system at large. It is the cause and origin of many of those chronic and intractable abdominal ailments which so often afflict Europeans resident in tropical climates, and entails most varied forms of impaired health when they return to European countries. The disease is rare in this country. It has been usual to describe cases of dysentery as either *acute* or *chronic;* but there are also cases belonging to a third class, which may be termed *complex.* In acute cases the inflammation does not confine itself to the tissues of the mucous membrane only. The serous covering of the intestines, or even such solid viscera as the liver, spleen, and kidneys, are involved in a disease-process. Ulceration or sloughing of large portions of mucous membrane and exudation go on together, and there may be very little corresponding fever at all commensurate with the severity of the lesions. so that while the disease is acute, it is at the same time, in many instances, of a masked and almost latent nature. Death may take place within the first ten or twelve days; but the disease may terminate in recovery gradually and spontaneously, or as the result of appropriate treatment, by the end of the third or fourth week. On the other hand, the disease may not end so favourably and early, but may advance unchecked; the morbid changes being slow in progress, often extending over several months, and then the case passes into chronic dysentery, one of the most hopeless and intractable forms of disease which the physician has to treat. The wasting of the tissues of the patient progresses steadily, till a human form, literally reduced to the state of a living skeleton, whose bones are held together by skin and ligament, is all that remains. The skin acquires a dry, bran-like, furfuraceous aspect, and the epithelium desquamates in scales and powdery particles. Various intercurrent morbid states become developed, not necessarily connected with the primary affection, but forming secondary lesions to the disease, and constituting the third form in which dysentery must be studied, namely,—as complex cases of dysentery in which there are various secondary lesions, which are regarded by some as directly connected with the primary affection. There are also secondary lesions connected with antecedent forms of disease, which sustain a renewed impulse to their development by the dysenteric state. These secondary lesions consist of,—(1.) Lesions of the small intestines, and of various solid viscera; (2.) lesions which may be referred to the co-existence of certain morbid states of the patient with the dysenteric condition, such, for instance, as the *typhous*, *scorbutic*, and the *scrofulous* state. In some cases a considerable portion of the *colon* and *rectum* only is affected; in other instances not only is the whole of the great gut the seat of some form of the exudative process, but the lower portion of the small intestine also. The most commonly affected portions, however, are the *rectum*, the *sigmoid flexure*, and the *descending colon*. When the *caput cæcum* is involved, the *vermiform appendix* participates in the process. Creamy-like exudations have been seen to fill its tubular glands, which in some cases proceed to ulceration and perforation. *Exuviæ*, or casts of the intestine, may be thrown off in large masses or shreds, leaving a raw-looking vascular surface underneath. In some respects this process and these casts are analogous to similar phenomena in *croup*, *diphtheria*, *dysmenorrhœa*, and *typhoid fever;* and by carefully examining the evacuations in cases of dysentery, important information may be obtained as to the nature of the process going on in the intestines. The evacuations should be washed with water in all cases, so as to get rid of the fæcal matters entirely, leaving the sediment, which is the product of the colonic disease, free from bile, fæcal matter, and offensive smell. This sediment consists of ropy, gelatinous, branny, or thready mucus; lymph in shreds or granular masses; pus, fæces, and sloughs. The *exuviæ* are thin, membranous, and sometimes infiltrated with pus; or they are thick and of a yellowish-brown colour. It is not till after the *eighth* or *twelfth* day of the disease that such sloughs are cast off; after which the symptoms diminish, and the patient may get well rapidly. During the shedding of the shreds the patients are much griped, and they pass with straining the sanguinolent masses or slimy mucus in small quantities fifteen or even twenty times a day.

Of morbid states of the solid viscera associated with dysentery, by far the most frequent complication is that with the *kidney* and the *liver*. The association of hepatic disease with dysentery is most frequent in the climate of the East Indies and West Coast of Africa, and in such climates as have a similar influence. Regarding hepatic complication, the following conclusions may be stated:—(1.) That dysentery, in a great number of cases, more than a half, commences and runs its course complicated by obvious functional hepatic disease. (2.) That the hepatic disorder and the dysentery acknowledge a common cause and disease-process. (3.) That about 18 per cent. of the fatal cases of dysentery are complicated with hepatic abscess; and about 57 per cent. with hepatic lesions. (4.) That in a few of these cases ulceration of the intestine may be the primary disease and the source of the hepatic abscess, by the phenomena of thrombosis and embolism in connection with the pelvic veins and veins of the mesocolon. Too narrow a view must not be taken of the relation of liver disease to dysentery; for, if we are to judge by the condition of the bile alone, the liver is diseased (in function, at least) in every case of dysentery. On the whole, it will be seen that the association of dysentery with hepatic abscess is not equally frequent in all countries, nor in all epidemics. Dysentery "is found to complicate readily in all climates with the prevailing fevers." Within the tropics it is frequently associated with *remittent* and *intermittent fevers;* in the geographical region of *typhus fever* it is a most frequent complication, under various circumstances, and becomes capable of propagation from person to person; and lastly, it is also occasionally complicated with *scurvy*—when the supply of food has been deficient in fresh vegetables, or when it consists in whole or in the greater part of salted meat. Types and forms of dysentery have been variously described as,—(1.) *The purely inflammatory*, *acute*, *hyper-acute*, or *sthenic* form; (2.) the asthenic forms. An ordinary attack of acute dysentery generally commences with *diarrhœa;* but in twelve or twenty-four hours disagreeable feelings begin to attend the frequent loose discharges from the bowels, such as irregular pains, commonly called "gripes," along the course of the large intestine, and described as "shooting," or "cutting" (*tormina*)—momentarily relieved by discharges from the bowels. After a short time a sense of heat ascends from the rectum, and pain extends to the epigastrium till the whole abdomen is painful. With frequently returning inclination to go to stool, the griping and straining continue without the patient being able to pass anything more than a little bloody mucus. These symptoms are aggravated during the night and early morning, and leave behind them the exhausting sensation that there always remains in the bowel something which has yet to be discharged. This feeling is technically called *tenesmus*, and ultimately becomes the most striking feature in the case. The acute pain in the abdomen generally concentrates itself at last about the rectum. The discharges from the bowels are at first scanty, consisting of mucus and blood, or bloody slime. The evacuations soon become more copious, tinged with bile, and carry off shreds of the exudation thrown out on the mucous surface of the intestine. Hardened balls of fæces, called *scybalæ*, are also sometimes discharged; and if much feculent matter pass, there is always considerable relief. When the disease is fully established, the discharges exhale an odour which is almost peculiar to dysentery, very offensive, and different from the smell of fæces. It is important to observe the character of the discharges, and especially as to the relative amount of blood; mucus, and shreds of exuviæ. In acute dysentery the patient may be carried off by copious discharges of blood. When the skin is dry, and of a pungent heat, the tongue furred, and the thirst urgent, the urine scanty and high-coloured, and the pulse increasing in frequency—these are symptoms of increasing danger in dysentery. Throughout the disease there is febrile distress, the nights are passed without sleep, or when it is obtained it is in short periods, dreamy, and disturbed; and when the patient awakes he is unrefreshed, and his spirits low and desponding. Convalescence is always slow, rarely complete; and there is perhaps no disease which makes so persistent and pernicious an impression on the human constitution as dysentery.

Treatment.—The *prevention* of the disease is all important. The conditions of the diet, that it be sufficient as to its animal and vegetable elements, and of good quality, must be investigated. To insure the means of detecting the disease early is necessary—for time is of the greatest importance in its cure, especially by removing the patient from the sphere of action of any of its predisposing or exciting causes, especially malaria; and also to see that his surroundings are free of all those circumstances which co-operate in aggravating the disease—the chief of which are over-crowding, bad ventilation, bad food, exposure to cold and wet, and intemperance. *Ipecacuanha* (*radix ante dysenterica*) was formerly, and still is, much in vogue as a remedy in dysentery; but, although highly useful in some conditions, it is not to be regarded as a specific in all forms of the disease. It is more effectual in the acute than in the chronic forms. It is given either in large or in small doses. The large dose method is to give as early in the disease as possible grs. xxv. to grs. xxx. of *ipecacuanha*, in as small a quantity of fluid as possible, or in the form of a *bolus.* A preliminary dose of opium is often of service in enabling the stomach to retain the *ipecacuanha.* The patient should remain perfectly still in bed, and abstain from fluid for at least three hours. Thirst may be appeased by sucking small bits of ice, or taking not more than a tea-spoonful of iced water. In from eight to ten hours, from 10 to 15 grains may be again administered, with the same precautions as before. The *tormina* and *tenesmus* subsiding, the motions becoming feculent, blood and slime disappearing, after profuse perspiration the patient falls into a tranquil sleep, and awakes refreshed. *Ipecacuanha* may require to be continued in diminished doses for several days, with sufficient intervals between each dose to admit of food being taken; and for several nights after the stools appear normal, grs. x. to xii. should still be given at bed-time. *Astringents* in any shape during the acute stage are not only useless but dangerous. *Blood-letting* has no beneficial influence over inflammation of the mucous membrane within the abdominal cavity. *Opium* is more valuable in the chronic than in the acute form of dysentery. It may be given in large doses combined with *acetate of lead* (gr. iii. to gr. iv.) in each dose, *nitrate of silver* or *sulphate of copper;* and in *enemata* it tends to relieve *tormina* and *tenesmus.* When the pains are excruciating and attended with *tenesmus*, *the warm bath* generally gives instantaneous relief, if adopted sufficiently early. It must be brought to the bedside, and kept at a high temperature (not under 99° or 100° Fahr.), and the patient is to remain in it till he feels faint. He is then to be carefully and quickly dried, put to bed, and have gr. xv. to xx. of *ipecacuanha*. *Leeches* to the number of six to twelve applied round the verge of the anus often afford sensible relief to the *tormina* and *tenesmus*, by unloading the portal and hæmorrhoidal veins. *In subacute and chronic dysentery* no remedy has proved more useful than *nitrate of silver*, in doses of half a grain to one and a half grains daily, reduced to fine powder, and conjoined with Dover's powder in the form of a pill. It has also been extensively used in the form of enema; also, a combination of *sulphate of copper* and of *opium* is often highly serviceable. *Solution of the pernitrate of iron*, *Dover's powder* (*Pulv. ipecacuanha composita*), *nux vomica*, combined with *opium* and *iron*, are remedies that are available and useful. "In no disease is early treatment more necessary than in dysentery; and if conducted judiciously, we may look for good results in a large proportion of cases, except in the malignant and 'putrid' forms. In the scorbutic form the *Bael fruit*, when procurable, is a valuable remedy."

Obstruction of the Intestines.

Natural History.—An obstacle or impediment which obstructs the passage through the bowel of its contents, occasions in a person hitherto healthy a sudden constipation, attended with disproportionate uneasiness or flatulence, soon merging into pain and distension of the belly, with violent rolling movements of the intestines. The distension increasing, nausea and vomiting supervene; and gradually becoming more frequent, any casual alimentary contents of the stomach are ejected, or a greenish, bilious, alkaline fluid is commonly thrown up when this organ is unoccupied by food, and also a fluid of greater opacity, colour, and consistence, with a distinctly fæcal odour. A further aggravation of these symptoms conducts the malady to its termination. This, if fatal, is usually preceded locally by signs of paralysis, inflammation, or even rupture of the distended bowel, and constitutionally, by exhaustion or collapse, replacing febrile re-action. In other cases, the obstacle being removed by nature or art (if by the former, rarely before life is in extreme danger), the symptoms subside; the pain, distension, and vomiting cease; the bowels are relieved by copious stools; and the patient (if not placed in further peril by any of those conditions incidental or consecutive to obstruction just hinted at) is rapidly restored to comparative health. The most remarkable and most characteristic symptom of intestinal obstruction is the fæcal vomiting. It has been shewn that the notion of *anti*-peristalsis as the cause of fæcal vomiting was contradicted by direct observation; and a careful study of the phenomena of intestinal obstruction, as witnessed in the human subject, and as artificially produced in experiments on animals, has led to the conclusion that fæcal vomiting results from a backward current in the liquids occupying the centre of the obstructed tube. In the first stage of obstruction abnormal *distension* of the intestine can generally be felt through the yielding wall of the belly—as a condition of fæcal vomiting—from the very commencement, and continuing a persistent physical sign through all stages. The character of the pain is sometimes sudden and violent, and often rises to great intensity in a very short time. It is distinct from the burning pain of peritonitis. It is usually intense in intus-susception and in the impaction of gall-stones; somewhat less marked in obstruction produced by twisting of the bowel, or by bands and adhesions; scanty in the obstruction of stricture; and almost absent in the obstruction caused by the impaction of fæces in the large intestine.

The forms of intestinal obstruction are mainly—(*a.*) Intus-susception, of which the varieties are *ileo-cœcal*, *iliac*, *jejunal*, and *colic.* (*b.*) *Obstruction due to bands*, *adhesions*, *diverticula*, *gall-stones*, *lesions*, such as rupture of *mesentery*, and other peritoneal lesions. The small intestine is the seat of the obstacle in 94·53 cases per cent. (*c.*) *Obstruction due to strictures*, *tumors*, *or twistings of the bowel and mesentery* give about 87·36 per cent. of cases involving the large intestine.

Intus-susception is the accidental insertion or protrusion of an upper into a lower segment of intestine. It occurs more frequently in infancy and childhood than at any other period of life. Invaginations of the small intestines are so frequently found after death in comparatively young and well nourished subjects, that it is believed they are formed with great facility, and that they often occur during life, giving rise to temporary bowel derangement; but that they also soon become disentangled again by the normal peristaltic movements. They appear to be produced also during the last moments of life—in the death struggle, or in the *rigor mortis* of the dead intestine. The *volvulus*, or portion of the gut where the obstruction exists, consists—(1.) Of the external portion formed by that part of the bowel into which the other has slipped; (2.) of the middle; and (3.) of the internal part, composed of the reflection of the invaginated portions. It is of practical importance to remember that, although the parts are greatly displaced, yet the anatomical relations of the serous and mucous surfaces of the intestine are never altered. Textures of the same anatomical character are always in contact one with another, and the channel of the gut along its mucous surface is always open. That such is the case may be understood by taking the leg of a long stocking from which the toe-end has been cut off, so that the stocking may be converted into a continuous tube open at both ends. If one portion of the stocking be then drawn into the other, a correct imitation of the relation of surfaces in an *intus-susception* will be obtained.

The symptoms of intus-susception indicate obstruction and inflammation. *In the child* they mainly consist of restlessness, sudden fits of crying, and straining as if at stool; a discharge of mucus, more or less mixed with blood and free from fæcal matter, sickness, and anxiety of countenance. These phenomena are generally, but not invariably, preceded by a sudden and violent action of the bowels. A physical examination of the belly may disclose a tumor or swelling of the intestine; and sometimes the invaginated part may be reached by the finger introduced into the rectum. *In the adult* the symptoms in cases of complete strangulation of the gut are sudden; and if the stricture be not relieved, the case proves fatal about the fifth or sixth day. On the other hand, in cases of intus-susception, the symptoms of the incarceration are by no means sudden nor rapid in their progress; or, rather, they are comparatively slower in their development and progress to a fatal issue than cases of complete obstruction by strangulation are. The impediment from the first is partial, and in some cases the obstruction is never complete, hence the symptoms may extend over many days, or weeks, or even months. Obstruction of the small intestine is chiefly characterised by—(1.) The umbilical seat of the pain, which is also more early and severe than when the large gut is implicated; (2.) vomiting is more early, severe, and frequent: obstruction is much more rapid, constant, and complete in the small than in the large intestine.

Treatment.—The chief indications are:—(1.) *To prevent distension*, by reducing the quantity of food and drink, restricting the latter to small sips (preferably through a long straw or tube) of cool iced liquids. Food is to be given, as strong *beef-tea*, *soup*, or *milk*, with small doses of alcohol (as *brandy* with *water*, or *soda-water*) alternately. *Water*, *milk*, and *gruel* are to be given in often-repeated *enemata*. (2.) *To assuage pain and to mitigate excessive peristalsis* by *opium*, given continuously and alone in the solid form—preferably in the *extract*. The practical limit of the dose is indicated by the comparative arrest of pain, the approach of narcotism, and decided contraction of the pupil. *Bella-*

donna diminishes the straining peristalsis, given *combined with opium*,—two parts of *extract of opium* to one, two-thirds, or even one-half part of *extract of belladonna* in a pill. *Enemata* are useful, by gradually distending the bowel at the site of obstruction, so as to effect such a change in its position and arrangement as may release the impacted portion. The quantity of fluid must be injected little by little, and must be retained as long as possible; and the patient must resolve to tolerate some pain in reaching that climax of distension at which only enemata are calculated to give relief. In cases where the intus-susception is in the large intestine, inflation of the bowel with air, as originally suggested by Hippocrates two thousand years ago, has of late years been revived and adopted, first in America, and subsequently in this country. It has been more successful than any other. By means of the ordinary elastic enema tube, fitted to the pipe of a small pair of bellows, a considerable quantity of air may be passed into the rectum, continuing the process till the belly shews signs of considerable distension, and even till uneasiness prevails. At the same time warm fomentations are to be applied to the belly. Relief of the urgent symptoms, such as straining and vomiting ensue; and gradually a fæcal evacuation is obtained from the bowels. The use of large enemata, with manipulation, has also been recommended. A long stomach-tube is to be passed as high up the colon as it will go, and the anus being firmly compressed round it, warm water is to be slowly injected, so as to distend the bowel as much as possible. When the fluid is allowed to come away, the abdomen should be pressed upon with the hands, so as to move about the coils of intestine. The patient may be put under the influence of *chloroform*, to facilitate the manipulations. When all remedies fail, *gastrotomy* may be thought of, and its chances of success considered. The only cases for which it seems suitable are in obstructions from bands, diverticula, and the like lesions affecting the small intestine—the object of the operation being to divide the cord-like cause of strangulation. When distress obviously exists from the accumulation and retention of gaseous fluid in portions of the intestinal canal (*tympanitis*), after the introduction of the rectum tube fails to give relief, a puncture into the cavity of the *colon* may be made by a small trocar and canula through the abdominal parietes, thus permitting the gas to escape.

DIARRHŒA.

Natural History.—This affection is rather a consequence or a symptom of certain pathological states than of itself a disease. In many cases a frequent discharge of loose or fluid alvine evacuations, without tormina or tenesmus, is a natural effort to get rid of some irritating material which has been passed onwards from the stomach in such a form that it cannot be made available for digestion and nutrition. The diarrhœa or bowel flux is an effort of nature to wash the irritant away. On the other hand, the excessive secretion is sometimes due to local lesions of the mucous membrane—*e. g.*, *catarrhal inflammation*, *follicular disease, lardaceous disease.* It is also sometimes a result of sudden mental impressions, as fear or unpleasant news; also of exposure to cold. It is a characteristic symptom of *malignant cholera*, concurrent with whose presence it has often been observed that there is a widespread prevalence of diarrhœa. The majority of cases, however, are to be regarded as local diseases from irritation of the bowel or from local lesions; whereas *summer cholera* (already considered) is different from a mere bowel flux, and is regarded as a disease affecting the individual in his entirety. The diarrhœa which is associated with cholera must be classed as *choleraic diarrhœa*, and regarded as subordinated to *malignant cholera*, and part of the specific phenomena of that disease. Diarrhœa may be regarded generally as the immediate result of unwholesome diet, excess in food or drink, cold, wet, fatigue, and exposure, and various functional derangements of the biliary and gastro-intestinal apparatus. The state of the discharges furnishes important indications in treatment. The most common appearances are due to the predominance of fluid feculent matter, or to bile, mucus, serum, chyle, or where undigested masses of food pass unchanged, giving rise to what is termed a "lientery." But the discharges are more often of a mixed kind, made up of several of those states.

Idiopathic forms of diarrhœa are,—(1.) *Diarrhœa of irritation;* (2.) *congestion, or inflammatory diarrhœa;* (3.) *diarrhœa, with discharges of unaltered ingesta* (*lientery*).

The treatment of these three forms is based on the following indications—*first*, cases in which the *tongue is clean*, the pulse quiet, and all constitutional re-action absent; *second*, cases in which the *tongue is white* and coated, the pulse accelerated, some fever present, and the pain or soreness constant and increased by pressure. The stools in either case may be black, green, white, or mixed with blood. An *opiate*, combined with a gentle *cathartic*, is generally sufficient to cure the first class of cases. *One grain of opium*, with a *drachm of compound rhubarb powder*, or with *three to five grains of calomel*, is a useful formula. The action may be aided by *castor oil*, or a *saline cathartic*, such as a *seidlitz powder* or *compound senna mixture.* Sometimes it may be advisable to omit the *opium*, and to combine *antacid* remedies with the *laxative*, which may be repeated at intervals, if necessary, twice or thrice a day; and *ipecacuanha* in small doses (a quarter or a sixth of a grain) may be sometimes advantageously combined with each dose. These medicines having produced their intended effect, others distinctly astringent may be administered if diarrhœa persists. A drachm of *syrup of poppies* after each stool is generally sufficient. In severe forms a scruple to half a drachm of the *compound chalk powder*, in some aromatic, such as *peppermint* or *cinnamon* water, every four or six hours, is an excellent remedy; and these medicines may be used whether blood be or be not in the stools. If the *opiate* and *aromatics* contained in the above medicine should prove insufficient, it may be necessary to add to each dose some of the class of pure astringents, as a drachm of the *tincture of kino*, or of *catechu*, or *hæmatoxylon*, or of *iron.* Absolute rest in the recumbent posture must be maintained, and warmth applied to the surface of the abdomen. Bland demulcent food, such as arrow-root with beef-tea or gruel, may be taken. But there are cases of diarrhœa with a *clean tongue*, which will not yield to *laxative remedies*, nor to *opiates*, *astringents*, or *stimulants*, either singly or combined, and which probably depend on a want of tone in the intestine. In these cases give *five grains of salicine* every four or six hours. *Tincture of the perchloride* or *pernitrate of iron* is similarly useful, in doses of five to ten minims, with *spirit of chloroform* and *glycerine* in *acacia mixture.* In the diarrhœa of whitish stools, with frequent calls and sudden desire to evacuate the rectum, and when muco-gelatinous matter like a jelly is passed, no remedy is of so much service as the *extract of nux vomica*, to the extent of *a fourth to a half grain dose;* or *strychnia* to the extent of *one-twelfth* of a grain, in a pill twice or thrice a day, with the *sulphate of iron* and *extract of calumba.* It is in diarrhœa of this kind that iron, such as the *tincture of the pernitrate*, is of so much service. In the second class of cases, when diarrhœa is accompanied by a *white furred tongue*, with pain and soreness, it is necessary to give opiates, combined with some *mild* saline purgative. Thus, *half a drachm to a drachm of Epsom salts* with a *drachm of the syrup of poppies;* or *fifteen minims of the tincture of hyoscyamus;* or, in severe cases, with *three* to *five minims of tincture of opium*, every *four* or *six* hours, are remedies on which we may rely. In other cases, *rhubarb*, *castor oil*, or any other *mild purgative*, may be substituted for the Epsom salts. In cases of diarrhœa accompanied by vomiting, *a drachm of syrup of poppies alone*, repeated every half hour, or every hour, for two or three times, may quiet the stomach, and enable it to bear other remedies; or *soda-*

water, or the *effervescing draught*, with a table-spoonful of *brandy*, with or without a few minims of *tincture of opium*, often remain on the stomach when everything else is rejected. *Sulphuric acid*, alternated with the *nirto-muriatic acid*, in doses of the *diluted* drug, of twenty to thirty drops, with water simply, or combined with the *compound tincture of gentian*, has been found a useful remedy.

The diet should be limited to *slops*, *puddings*, and *white fish boiled*, and the drink to weak *brandy and water*, which acts locally as an astringent, and generally as a diffusible stimulus.

COLIC.

Natural History.—A painful affection of some portion of the abdomen, caused by violent contraction of the muscular fibre of some portion of the intestinal canal, arises generally from indigestion, exposure to cold, the effect of lead poison, or other general cause. The bladder may participate in the spasm, the urine being either frequently ejected or suppressed. Colic is usually sudden in its attack at any period of life, the patient without any previous indisposition being unexpectedly seized with a severe fixed pain in some part of the abdomen, but which is relieved on pressure, so that he either sits doubled up, or rolls on the ground, or lies flat on the belly. Where much air is generated, the bowels are greatly distended, and the pain is compared to a twisting or wringing around the navel, accompanied with soreness. The walls of the abdomen participate in the internal spasm, so that the navel is drawn in towards the back, or the heads of the *recti* muscles become exceedingly prominent, resembling so many round balls. The bowels are generally but not always constipated, and the stomach may reject both food and medicine. The pulse is little altered at the commencement of the attack; but if the paroxysm be prolonged, and the patient exhausted by pain, it may be hurried and frequent. The tongue is generally clean, although sometimes white and coated.

The treatment is by *opiates*, *chlorodyne stimulants*, and *purgative medicines*. When the bowels are constipated, *five grains of calomel*, *fifteen grains of jalap*, and *one grain of opium* should be administered immediately, followed by ℞. *Mist. Camphoræ* c. *Magnesiæ Sulphat.*, ʒj.; *Tinct. Hyoscyami*, ♏xv. to xx.; *Tinct. Cardamomi*, ʒj. To be repeated every five or six hours until stools are obtained. In mild cases a scruple of *rhubarb*, or half an ounce of *castor oil*, or other mild purgative, combined with a grain of *opium*, may be substituted for the *opium*, *calomel*, and *jalap*. *Opium* in full doses (gr. i. to ii.) is also more generally useful in uncomplicated colic than any other remedy. *Enemata* generally give immediate relief. Externally, the application of large bags filled with hot *camomile flowers*, or of *heated sand*, or *heated salt*, or the *stomach-warmer filled with hot water*, *warm bath*, *fomentations*, or a *large linseed* or *mustard poultice* over the abdomen, are useful. The diet should be sago or arrow-root, with or without brandy, as required and prescribed.

Constipation and Costiveness.

Natural History.—A retention of fæces beyond the usual period, so that they are passed with difficulty, and in a comparatively hard indurated state, the expulsive power being deficient (*constipation*). Sometimes the quantity is also too small—a condition known as *costiveness*. Usually such functional difficulties may exist without the slightest trace of organic lesion. Two causes appear to combine—want of sensibility of the nerves of the mucous membrane of the alimentary canal to the stimulus of their ordinary fæcal contents, so that the peristaltic motion downwards is retarded; or, there is a general absence of mucous secretion from the glands of the intestine. Every form of impaired digestion may be a cause of *constipation* or of *costiveness*. The existence of hæmorrhoids, as well as a too sedentary life, application to study, women labouring under amenorrhœa, or other functional disease of the uterus, have often constipated bowels; and almost every acute disease is occasionally ushered in by constipation. It is a common concomitant of most chronic affections. Many articles of diet, and many medicinal substances, as *lead*, *opium*, or other *astringents*, are causes of constipation. It is most common after the middle periods of life; and women, from their more sedentary lives, the greater capacity of their colon, and their greater delicacy on the subject of bowel evacuations, are most disposed to constipation. It is a frequent cause of distress during pregnancy. In some instances the fæcal matter retained collects in the caput coli, and forms a tumor so considerable that it has been mistaken for *fungus hæmatodes*, or an *aneurism*.

Treatment.—When constipation is *occasional* and *accidental*, any of the milder laxatives, as the *sulphates of soda* or of *magnesia*, *castor oil*, *rhubarb*, *aloes*, or the *confectio sennæ*, or the *pilulæ colocynthidis comp.*, will in general move the bowels. In obstinate constipation, *tartrate of antimony*, to the extent of one-fourth of a grain, combined with a drachm of *sulphate of magnesia* every hour, will generally bring fæces away after nausea supervenes. In cases of *habitual constipation*, the combination of a *tonic* with a *laxative* will often produce a more efficient action than perseverance in the use of purgative medicines alone. Thus two grains of the *ferri sulphatis*, or *an ounce and a half of infusion of gentian*, combined with a drachm of the *sulphate of magnesia*, given three times a-day, or every six hours, will empty the bowel when the salt alone would fail. In elderly persons, a combination of *aromatics* with a *purgative*, as in the *decoctum aloës*, is a more useful and effective remedy than the same or even a greater quantity of *aloes* alone. *Aloes* is a most useful remedy when the colon seems specially at fault as a result of fever and debilitating diseases, sedentary habits and occupations. A most useful form is that of the *watery extract*, combined with *aromatics* alone, such as *essential oil of ginger;* or with *quinia*, *extract of nux vomica*, *ipecacuanha*, and some aromatic oil. Where *slow digestion*, with a *deficiency of mucus secretion* prevails, the following formula for a pill is useful, of which one ought to be taken an hour before dinner, and another an hour before breakfast:—℞. *Pulv. Ipecacuanha*, gr. viii.—gr. xii.; *Ext. Aloe*, gr. xii. (*vel mas. pil. Aloe et Myrrh*, gr. xxx.); *Sulphatis ferri*, gr. xviii.—xxiv. *Misce, et divide in pil.* xii. Such pills ought to be continued regularly till the occurrence of a "loose motion," after which one only, an hour before the principal meal, will be sufficient. Purgatives alone ought never to be prescribed. More food, both solid and liquid, may require to be taken; and all medicines for the relief of constipation ought to be given just before or with the food. When constipation arises from torpor of the colon, equal parts of *compound gamboge pill* and of *compound colocynth pill* are most useful. If medicines by the mouth have been insufficient, it may be desirable to hasten their action by *enemata*, such as a pint of warm water, 100° Fahrenheit; or the same quantity of warm water, with half an ounce of *common salt;* or the *common soap* enema (a strong solution of soap); and when constipation is great, half a pint to a pint of *castor oil*, *neat*, may be thrown up. Sometimes the fæcal matter accumulated in the colon is so large in quantity, and so hard and impacted, that manual assistance is necessary to relieve the patient.

(c.)—*Diseases of the Liver.*

HEPATITIS.

Natural History.—In all countries in the temperate zone, at least two forms of inflammation of the liver occur. One terminates in simple or granular induration, and has a clinical history of its own; the other, in a greater or less extent of softening and acute atrophy of the gland, with jaundice and febrile phenomena of a malignant typhoid type (*acute yellow atrophy*). In tropical climates a third form has a tendency to result in suppuration, and is described under the name of *suppurative* *hepatitis.* The inflammation may have its seat in the fibrous envelope of the gland (*perihepatitis*); or in the sheath of the vessels in Glisson's capsule; or chiefly the glandular parenchyma, the portal or hepatic veins, or the bile-ducts.

Inflammation of the Capsule of the Liver (*Perihepatitis*) and of Glisson's capsule is rarely accompanied by serious derangements, unless the inflammation extends to the portal or hepatic veins, or causes obstruction of the larger bile-ducts. It may exist alone in some cases of syphilitic infection; but it is most frequently associated with *interstitial hepatitis.* Peritonitis, disease of the liver itself, or inflammation of neighbouring structures, such as pleurisy, are the usual causes of *perihepatitis.* The chief symptoms are, tenderness over the hepatic region on pressure, motion, or deep inspiration, without any change in the volume or situation of the organ. Jaundice, as a rule, is absent; so also are febrile phenomena.

Inflammation of the Glandular or Hepatic Parenchyma occurs either as a circumscribed process limited to isolated patches, which leads in most cases to suppuration and the formation of abscesses, or it is diffuse, extending over the entire organ in a more or less uniform manner, inducing rapid destruction of the gland elements, with softening and atrophy of the organ; or it induces induration and cirrhotic degeneration.

Treatment.—Tartar emetic in one-eighth or one-fourth grain doses every two or three hours is of service in the acute inflammations, if given sufficiently early—*i. e.*, within the first three days, when there is much vascular excitement, and a full bounding, unyielding pulse, with a dry hot skin and scanty urine. *General blood-letting* (see page 78, *ante*) may be adopted *if there be evidence of obstruction to venous blood-flow through the right side of the heart;* but usually *local depletion by leeches* over the region of the liver, and also round the anus, so as more directly to unload the portal system, must be at once resorted to, and will generally be sufficient, followed by *fomentations* and large *linseed meal* poultices, made as light and soft as possible, over the hepatic region. *Mustard* may be added to them, or *laudanum* may be sprinkled over their surface. *Saline purgation* and *alkalies*, with or without *colchicum*, are also to be freely administered. *Hot turpentine epithems* are very beneficial. *Iodide of potassium*, in combination with *taraxacum*, is of great service in the chronic forms. *Alcoholic stimulants* and *fermented drinks* must be absolutely forbidden, and the diet restricted to mild nutriment, such as *milk*, *beef-tea*, and *farinaceous food* generally.

Abscess of the Liver.

Natural History.—Suppurative inflammation (ending in a circumscribed collection of pus, or in several separate abscesses), is limited to one or to several isolated portions; and, with the exception of congestive turgidness of the contiguous texture, the remaining portions of gland-tissue are rarely implicated. The inflammatory process extends till perforation occurs, or till several contiguous *foci* or inflamed and suppurating portions unite into one large abscess, or till the pus finds an outlet. The pus is rarely passed into the abdominal cavity; for adhesive inflammation of the capsule covering the abscess almost invarably occurs, so that attachments form to the abdominal walls and adjoining organs. Frequently the abscess perforates the thoracic or abdominal wall superjacent to the liver, and opens directly outwards. The locality for such spontaneous opening is usually the space below the ensiform cartilage. The pus may also discharge itself into the pelvic, inguinal, or sacral regions, close to the spine. Sometimes the abscess tends, in an upward direction, to penetrate the diaphragm, when it generally empties itself into the right pleural cavity; but more often forces its way into the substance of an adherent right lung, by a distinct suppurative process, and in favourable cases passes by a free opening into a bronchus, whence it is discharged. The stomach, the duodenum, and the colon are the principal abdominal organs into which abscesses of the liver may also discharge.

The symptoms are fever, with repeated rigors, severe headache, and sometimes delirium, but there may be no symptoms pointing to disease of the liver. The difficulties which embarrass the diagnosis of suppurative hepatitis cannot be over-rated. In 13 per cent. the disease runs a perfectly latent course, and in only 8 per cent. are symptoms at all well marked. In most cases a correct diagnosis will only be arrived at by not relying upon individual symptoms; but by taking a general view of the mode of origin and entire clinical history of the case, and after excluding, by comparison, the diseases of the liver and the neighbouring parts, which may give rise to symptoms similar to those of hepatitis. The most prominent symptoms of hepatic abscess are, however, some tumefaction, pain, or uneasiness of the liver, or of the adjoining parts, as the thorax, abdomen, or right shoulder; an affection of the bowels, as diarrhœa or dysentery; and, lastly, pyrexia in a continued, remittent, or intermittent form.

The treatment of abscess when it tends to make its way outwardly, is still an open question as to whether or not an artificial opening ought to be made, the prominences of the false ribs and obliteration of the intercostal spaces being considered sufficient, in the absence of fluctuation, to justify the operation. In its performance care must be taken to prevent the entrance of air into the abdominal cavity, by the method of opening a lumbar abscess adopted by Professor Lister of Edinburgh.

Some think it better to allow an abscess of the liver pointing through the abdominal wall to open of itself, for the following reasons:—(1.) Because of the inelastic structure of the lobular substance of the liver not permitting the cavity to contract when a free opening has evacuated the pus; (2.) because air invariably enters when an artificial opening is made, and rapid decomposition of the pus takes place, and renewed inflammation of the walls of the sac sets in; (3.) this renewal of inflammation and fever may end in gangrene, and may thus rapidly prove fatal; (4.) when the operation is entirely left to nature, *small worm-eaten-like openings serve to discharge the pus*, so that it has a slow but constant escape. As these apertures never close up, and as the matter is always oozing out, air cannot enter, no decomposition takes place (no septicæmia occurs), and no secondary fever sets in. The patient feels no shock from the loss of the matter, which escapes so gradually, and as it escapes the sac contracts and finally closes up. After the abscess has opened, strict rest must be enjoined. Convalescence is always tedious; and sometimes the cicatrization of the abscess is imperfect, continuing to discharge pus at intervals for years.

Acute Atrophy of the Liver.

Natural History.—When simple jaundice, gradually increasing, with sensitiveness over the region of the liver, is followed by violent constitutional disturbance, expressed by pyrexia, headache, delirium, hæmorrhages from various parts, and finally coma;—when the liver shrinks to one-half or one-third its normal size, and a peculiar chemical decomposition takes place in it whereby abnormal proximate principles are formed, which, being carried into the blood, may be discovered in various organs of the body, or, passing out by the kidneys, may be found in the urine, the condition is to be recognised as one of acute atrophy of the liver. It seems the result of a form of hepatitis, of the nature of *parenchymatous inflammation*, already frequently referred to—*cloudy swelling* of the cell elements, and their subsequent destruction by softening or disintegration, so that the acini are not capable of recognition. The parenchyma is thus relaxed, shrivelled, and flabby, and the liver sinks against the posterior wall of the abdomen. The size of the organ is diminished in all directions, but especially in its thickness. *The symptoms* set in, like a bilious attack, with feebleness, rapidly followed by jaundice, pyrexia, and vomiting, delirium supervening by the third or fourth day. The pulse is at first abnormally slow, but at the outbreak of cerebral symptoms it gradually rises to 110 or 120, and presents remarkable variations as regards frequency and volume. Towards the close of the disease it increases in frequency, and becomes smaller and smaller till it can no longer be felt. The body-temperature also rises very high. The cerebral symptoms generally resemble those of uræmic intoxication; collapse increases, perspiration becomes copious, and the patient usually dies comatose about the second day, more rarely about the fourth or fifth day after the first appearance of cerebral symptoms. Such acute atrophy of the liver is apt to be mistaken for *typhus fever*, complicated with *jaundice* or with *pyæmia*. The range of temperature may help to indicate the disease, which is almost always fatal.

SIMPLE ENLARGEMENT—*Syn.*, CONGESTION OF THE LIVER.

Natural History.—Simple enlargement of the liver, from fulness or distension of its blood-vessels and bile ducts, is expressed in various forms. There may be—(1.) *Congestion from increased secretion of bile*, and its accumulation in the bile ducts; (2.) *passive congestion* of the hepatic veins or of the portal veins; and (3.) *active congestion*, chiefly involving the arterial capillaries. By far the most frequent cause of hepatic blood congestion is valvular disease of the heart (soonest in affections of the right side, later in those of the mitral, and latest in those of the aorta); and especially obstruction to the circulation through the right side, interfering with the emptying of the right auricle. These congestions, so far as the liver is concerned, are of a passive kind; and their most marked and constant effect is to produce *ascites*, with or without *anasarca*. If such congestions continue long, they lead to bilious contamination of the blood. *Congestions of the liver* are chiefly brought about by sudden chills, the cold stages of fevers, over-abundant feeding, intemperance in alcoholic or malted liquors. Products of faulty digestion are thus at once carried to the liver, and influence its circulation; and so also does excessive bodily exercise in the heat of the sun. Increased secretion and elimination of bile also leads to enlargement. This condition is brought about by some increased excitement of the liver, as by certain kinds of food or drink; but more especially it is brought about in Europeans by exposure to unusually high ranges of temperature. In summer and autumn it is a morbid state not uncommon in our own country; but to the European on first landing in India it most commonly occurs, and in either case it occasions what is termed a "bilious diarrhœa." With excessive secretion of bile, the patient has purging of bilious stools, causing scalding of the anus. There is slight sickness just before the bowels act. A bitter taste is felt in the mouth, and the tongue is foul. The liver bulges on account of its swollen condition, accompanied by uneasiness on exploration, or of weight on getting into the erect posture. The countenance and complexion may be pale, sallow, or dusky livid; the tongue coated, the bowels constipated, the appetite defective; and there may be nausea, vomiting, and headache. The pulse is slow, compressible, and irregular, or quick and feeble; and, generally speaking, the symptoms are obscure.

Treatment.—Congestions are mainly relieved by a restricted and judicious diet—abstinence from all *rich dishes* and *fermented liquors*. *Active exercise* in the open air, such as *riding on horseback* especially, must be taken till fatigue is produced sufficient to induce a desire to rest. *Plummer's pill* at bedtime, followed by a *seidlitz powder* or *Pullna water* in the morning, or by the usual *black draught*, or by *compound mixture of senna*, or by such saline purgatives as *sulphate of magnesia* and *bitartrate of potash*, which cause a drain from the portal system of veins, usually give relief. But a purgative dose of *calomel*, especially combined with *compound jalap* powder, is of all combinations the most efficient in diminishing congestion of the liver. After its action the local weight, the pain, the fulness, and other symptoms subside concurrently, with copious bilious stools. An active aperient ought to be prescribed every second or third day for ten days or a fortnight after the action of the *calomel* purgation. In chronic congestion the external use of *iodine ointment* sufficiently diluted is of service. Two leeches every second day to the verge of the anus, and repeated from ten to fifteen times, also give great relief. *Nitro-muriatic acid* is also a valuable remedial agent. *Taraxicum* diminishes abdominal plethora, combined with *aloes*, *colchicum*, and *ipecacuanha* in pill. An electuary, composed of equal parts of *sublimed sulphur* and the powdered *gum resin of guaiacum*, in *syrup of ginger*, will be found a most useful remedy in cases where the congestion of the liver is associated with hæmorrhoids, a form which is extremely common. When dropsy prevails, doses of the *diuretic pill*, of *hydrargyrum*, *squills*, and *digitalis* (a grain and a half of each ingredient) should be taken night and morning.

CIRRHOSIS.

Natural History.—This chronic form of diffuse inflammation expresses itself by simple or granular induration of the substance of the liver, sometimes called *cirrhosis*, *insterstitial hepatis*, *hob-nailed* or *gin-drinker's liver.* It commences with interstitial inflammation, leading to increase of the connective-tissue and its subsequent contraction. As a rule, the disease only comes under observation when it is more or less completely developed, and when consecutive disorders always associated with it draw attention to the state of the liver. The various morbid changes which accompany cirrhosis of the liver, may give rise to a long series of functional derangements, which in practice constitute the *symptoms of cirrhosis.* These are mainly—(1.) Derangements of the chylopoiëtic organs, from impediment to the passage of blood through the portal vein into the hepatic veins, and its stagnation in the radicles of the portal vein; (2.) impairment, passing to complete suspension of the functions of the liver. Derangements of the stomach, a loaded tongue, nausea, and occasionally vomiting and faint jaundice, are the earliest symptoms. Digestion continues feeble, and distension and tenderness of the epigastrium, along with heartburn, flatulence, and constipation are developed. The patients lose flesh and strength, and their colour becomes pale or dirty yellow, while the skin is dry and rough. The abdomen becomes distended and fluctuates, but the liver is found reduced and the spleen increased in size, while increasing ascites or tympanitis induces more or less dyspnœa. Ascites is the most common and constant symptom, and hæmorrhages from the stomach or intestines are apt to occur as the disease advances, which relieves splenic congestion. The chief cause of cirrhotic induration is the abuse of spirituous liquors. In other words, it is due to the specific action of *alcohol* as an irritant or stimulant poison, especially in the form of *gin* in this country and *schnapps* in Germany. *Alcohol*, however, is not the only irritant capable of inducing the proliferation of tissue by cirrhotic or adhesive inflammation. Numerous products of faulty digestion, or of material such as spices taken into the stomach, act as irritants, and other causes are *syphilis* and also frequent attacks of *intermittent fever.* The cirrhosis from syphilis is generally associated with lardaceous disease, and has a characteristic form.

Treatment has first the object of relieving the disorders of function which mainly threaten life. Absolute abstinence from alcoholic spirits is indispensable, and the *diet* should consist of mild, simple articles of nourishment, especially easily digested animal food. *Coffee, spices,* and articles *irritant* to the liver must be avoided. Swelling and tenderness suggest *leeches* and *fomentations. Mild saline laxatives* may be given; and when the tenderness ceases, the bowels may be kept open by *rhubarb.* When nausea or vomiting occurs, *hydrocyanic acid, hypophosphite of soda, belladonna, morphia,* or *extract of nux vomica,* are particularly suitable. The gastric and intestinal catarrh require to be subdued by *alkaline carbonates.* They lessen the viscidity of the mucous secretion. When pain prevails, *cupping* or *leeches* are indicated over the liver. *Saline purgatives,* such as *sulphate of magnesia* or *bitartrate of potash,* should also be given, while iced drinks and low diet must be the rule of life.

LARDACEOUS LIVER—*Syn.,* AMYLOID DISEASE OF LIVER—WAXY LIVER.

Natural History.—The existence of a peculiar homogeneous, translucent, albuminoid material in the walls of the hepatic arteries, cells, and texture of the liver, resembling an infiltration, is a substantive disease known by these names. The new material is not found in the blood; and though frequently associated with fatty degeneration, and sometimes described as *scrofulous* liver, yet it has no necessary connection with either condition. The liver is one of the most frequent seats of lardaceous disease. (See page 44, *ante.*) The following are the general and local grounds for suspecting the existence of this disease—(1.) When there is general ill-health, expressed by *marasmus, anæmia,* or *dropsy,* which constitute the primary symptoms in cases otherwise ambiguous, and which may be associated with diarrhœa, vomiting, and cardiac systolic murmur. (2.) In cases where (after examining the blood) such symptoms as are mentioned cannot be traced to lesions of such organs as we have hitherto been accustomed to refer these phenomena. (3.) In cases where the constitution is enfeebled, and health is impaired by *ulcerations of bones, syphilis, malarious fever, tuberculosis, malaria.* The local indications of lardaceous disease of the liver are—(1.) Uniform enlargement of the organ; (2.) increased consistence, indicated by firmness; (3.) association of these characters with tumid spleen and albuminous urine; (4.) association of these characters with any of the general conditions enumerated under (3.) The prominent general symptoms of this fatal disease being "anæmia, prostration, exhaustion," the condition of the liver, spleen, and kidneys should be investigated in all cases of this nature, and their condition recorded, especially in cases of *syphilis, caries, necrosis,* and *intermittent fever.* Death usually occurs by exhaustion.

Treatment.—*Iodine* and *iron* are the remedies indicated by the nature of the disease and the circumstances under which it occurs.

JAUNDICE—*Syn.*, ICTERUS.

Natural History.—Cases in which many of the different tissues and fluids of the body are dyed yellow, more especially the conjunctiva and the connective tissue, from the colouring matter of the bile, are known as cases of jaundice depending on certain morbid conditions — especially organic disease of the liver or duodenum. It may arise in two ways,—(1.) By mechanical obstruction to the passage of the bile into the intestines, and the consequent re-absorption of the detained fluid into the blood; (2.) the suppression of the biliary secretion arising from some morbid condition of the liver itself, whereby biliary ingredients accumulate in the circulation. Some of these ingredients or constituents of bile are generated in the liver itself (*e.g.*, the bile acids), others exist pre-formed in the blood (*e.g.*, the green bile-pigment, or *biliverdine*, and the *cholesterine*). The mechanism of jaundice has therefore been regarded from two points of view, namely, —(1.) Jaundice from suppression, retention, or non-elimination; (2.) jaundice from re-absorption of bile. In the former jaundice is characterised by the rapid accumulation of green bile-pigment in the blood, until the serum, and the tissues, and the urine are saturated with the colouring matter. Jaundice by suppression or non-elimination arises from (1.) Innervation; (2.) disordered hepatic circulation; (3.) loss or destruction of the secreting cells of the liver, as in acute and chronic atrophy, cancer, tubercle, fatty degeneration, and lardaceous disease. The second class of cases of jaundice arises from the re-absorption of the secreted but retained bile. They are characterised by the accumulation of pigment in the blood; whence it stains the tissues, the urine, and the serum. The bile in these cases is absorbed from the distended ducts and gall-bladder; and the biliary products manufactured in the liver, equally with those formed in the blood, find their way back into the circulation, to be eliminated by the excretions. Hence the bile-acids (absent in the former class of cases of jaundice) are present in cases of jaundice from re-absorption, as well as the bile-pigment; and these acids possess the property of dissolving the red-blood corpuscles. Obstruction is due chiefly to—(1.) Congenital deficiency (very rare); (2.) disease, generally of parts in the vicinity of the head of the *pancreas*, or of the *ductus communis choledochus*. The earliest sign of jaundice is a yellowness of the white of the eyes, then of the roots of the nails;

next yellowness extending over the face and neck, and ultimately over the trunk and upper and lower extremities. The urine becomes of a deep red colour, and stains linen yellow. At the same time that the urine is thus discoloured, the stools, often abundant in quantity, are white. The pulse is slow, and the patient complains of a bitter taste in the mouth, has much thirst, an absolute inaptitude for all exertion, and suffers from a lowness of spirits amounting to hypochondriasis. The first symptom of recovery is the appearance of bile in the stools, after which the yellowness fades away from parts in the inverse order of its appearance.

It is necessary to determine in every case how far the jaundice is due to—(1.) obstruction, or (2.) non-elimination (suppressed secretion). The presence of *biliary acids* in the urine is characteristic of jaundice from re-absorption, as distinguished from jaundice arising from non-elimination or suppression. "To a couple of drachms of the suspected urine add a small fragment of loaf sugar, and afterwards pour slowly into the test-tube about a drachm of strong sulphuric acid. This should be done so as not to mix the two liquids. If biliary acids be present, there will be observed at the line of contact of the acid and urine—after standing for a few minutes—a deep purple hue. This result may be taken as a sure indication that the jaundice is due to obstructed bile-ducts. On the other hand, the absence of this phenomenon, and the occurrence of merely a *brown* instead of a *purple* tint, although in the earlier stages of jaundice equally indicative of suppression, is no indication of the cause of the suppression, which must be gleaned from other circumstances.

Treatment.—As a general principle, the larger number of cases of jaundice from functional disorder will get well in time spontaneously, but may be aided by remedies judiciously selected according to the diagnosis already indicated. First, aim at removing the exciting cause; and in jaundice due to congestion of the liver, purgatives seem to act beneficially in the form of *blue pill* or *Plummer's pill*, with *aloes*, *nux vomica* and *rhubarb pill mass.* In cases of acute jaundice from suppression of the biliary secretion, two or three doses of *hydrochlorate of ammonia*, to the extent of gr. xx. every four hours, may produce a restoration of that secretion. It is a most powerful restorative of the biliary functions. *Acids* and *alkalies* are alike contra-indicated in cases of jaundice resulting from active congestion of the liver. *Podophyllin*, combined with *hyoscyamus*, is of use in jaundice from suppressed secretion of bile. It is especially useful combined with vegetable tonics, such as *gentian* and *quinine*, in cases of feeble liver action, but it ought not to be given in cases of jaundice from obstruction. *Sulphate of magnesia*, in half drachm to drachm doses, combined with fifteen grains of *carbonate of magnesia* and half a drachm of *aromatic spirits of ammonia*, given three times a day an hour before food, is most generally useful.

(*d.*)—*Diseases of the Hepatic Ducts and Gall Bladder.*

GALL-STONES.

Natural History.—Concretions of certain biliary constituents, accumulating generally in the gall bladder as gall-stones, the passage of which through the duct into the duodenum gives rise to symptoms known as "gall-stone colic." Such concretions as biliary calculi may be found filling the gall-bladder, the structure of which and of the liver being perfectly healthy, even when the gall-bladder contains numerous calculi with sharp angles and edges. They have been found "*in transitu*" in the *cystic duct* and in the *ductus communis.* Occasionally they have been found in the *hepatic ducts*, where they are apt to excite *suppurative hepatitis.* Gall-stones are composed principally of two substances, *cholesterine* and *colouring matter*, in various proportions, together with some animal matter, the usual bile salts, and perhaps a trace of iron. Bile pigment, with choloidinic acid and its calcareous base, also occasionally accumulates in solid masses, which may be arranged into crystallized, deposited, amorphous, and porcupine-like calculi. Gall-stones appear to be peculiar to adults; and generally occur after twenty, but most commonly between forty and sixty. They affect women more frequently than men, and persons of sedentary rather than those of active habits of life. They are particularly frequent in patients with carcinoma of the stomach and liver. Their formation is unattended with pain; and once formed they may lie latent for a considerable time in the gall-bladder, without causing any trouble to the patient. At length, however, some cause forces a stone into the *cystic duct*, when a series of very formidable symptoms arise (*gall-stone colic*), which continue till the calculus has passed into the duodenum. Occasionally calculi of small size may pass through the *ductus cysticus* and *communis choledoctus* without exciting pain or any other symptom. The attack is generally sudden, with shivering, accompanied by violent and acute piercing, griping, insupportable pain at the point corresponding to the opening of the duct into the duodenum, whence it spreads over the whole abdomen to the right side of the thorax and right shoulder, and darts through the back—in paroxysms varying in duration from a few minutes to a few hours, till the gall-stone has passed into the intestine. The pain is so great that patients most tolerant moan, double themselves up, and roll about on the bed or floor. It is impossible for those who have witnessed a case of this kind not to be struck with the resemblance which many of its symptoms bear to those of parturition—a comparison women who have borne children frequently make when describing their sufferings from gall-stone colic. When the pain intermits, however, there is a deep-seated soreness and fulness of the right hypocondrium and epigastric regions. Like parturition, one attack of pain succeeds another, till at length pain ceases, when the calculus may be inferred to have passed into the intestine. After that the soreness and uneasiness gradually cease, and the patient is restored to health. In some cases jaundice makes its appearance, and may continue for a considerable time after the calculus has passed—the dejections being clay-coloured or natural; and, on a close examination from time to time, are ultimately found to contain the offending calculus. The pulse during the paroxysm is for the most part natural, unless the patient is exhausted by long continuance of pain, when it becomes small, the skin cold, and the face pale. The duration of the attack is sometimes only a few hours, but it may continue a few days, while sometimes several weeks may elapse before the gall-stone is expelled.

Treatment.—The indications are to facilitate the passage into the intestine, to relieve the intense pain, and to prevent inflammation. Half a grain of solid *opium*, or a quarter of a grain of *morphine*, or twelve drops of *laudanum*, or the *mistura camphoræ*, ℥ xj. *conf. opii.* ʒ ss. to ℈ij. c. *sp. æth. nitr.* ʒ j. should be given every hour, or every two hours, till some relief is obtained, or till there is slight narcotism, when similar doses may be repeated every four or six hours. If vomiting be severe so that medicines are rejected, the opiate may be given *hypodermically*, commencing with not more than one-fourth of a grain of the *muriate of morphia* in solution, or *opium* may be administered by enemata of *laudanum*. Careful inhalation of *chloroform*, till anæsthesia is produced, also gives great relief, and is a valuable remedy when paroxysms are most violent. Given internally, *chloroform* appears to exercise some influence as a solvent of biliary concretions—♏ ii. to ♏ iii. of *chloroform* being given three or four times a day in *mucilage of compound tragacanth* powder. Marked benefit may also result from the *extract of belladonna*, in half-grain doses every two or three hours. The *hydrate of chloral*, as it produces extreme muscular relaxation, is also worthy of mention. Small pieces of ice in the mouth are most efficacious in relieving vomiting. *Emetics* or *laxatives* are not to be given during the attack.

A *warm bath* should also be immediately prepared, as hot as the patient can bear it, and the immersion should continue till he is in some degree exhausted. If a warm bath cannot be procured, *fomentations*, or a large *linseed poultice*, should be applied over the abdomen. *Hot flannels*, *hot sand*, or *hot camomile flowers* also afford some relief.

The calculus having passed, and the patient being relieved, the secretions of the liver should, if possible, be rendered more healthy; and a short course of neutral salts, or of the Cheltenham or Leamington waters, ought to be taken in this country, or of Vichy, Marienbad, Kissingen, and Karlsbad waters.

The radical treatment of biliary calculi by medicinal agents and diet ought to be attempted during the intervals between the attacks of gall-stone colic by the use of alkaline solvents.

(*e.*)—*Diseases of the Peritoneum.*

PERITONITIS.

Natural History.—An inflammation of the serous membrane lining the cavity of the abdomen, and covering the viscera contained in that cavity, may be partial or general, acute or chronic, with changes similar to those in the pleura. The forms of peritonitis to be distinguished are—(a.) *Metro-peritonitis*, or *puerperal peritonitis;* (b.) *chronic peritonitis;* (c.) *suppurative peritonitis;* (d.) *tubercular peritonitis;* (e.) *adhesive peritonitis;* to which may be added (f.) *encysted inflammatory products* and local adhesions of the parts opposed to each other. These forms indicate at once a local source of irritation as the immediate cause of the peritonitis. Peritonitis is occasionally ushered in by some previous shivering and fever, but in many cases there are no preliminary symptoms. Symptoms from perforation of the intestine or stomach are characterised by *suddenness* and *intensity* of pain, referrible to a particular region of the abdomen; but soon the whole abdomen becomes painful to pressure, which is so constant and exquisite, and leads to such lowering of the heart's action, that death rapidly follows by *asthenia.* If acute peritonitis should not terminate by resolution, but by effusion of serum or of lymph, there is severe pain in the abdomen, increased on pressure; a pulse from 90 to 120, and peculiar in this respect as an inflammatory pulse, that in proportion as it is frequent, so is it smaller. The tongue is coated. Serum, lymph, or pus may be effused. If lymph form, a rubbing sound may be heard under the stethoscope when the abdominal movements of respiration are not suppressed. When acute peritonitis is local—confined, for instance, to the surface of the liver or other organ—the pain is limited to that part, while other symptoms vary according to the severity of the affection and the organ whose covering is affected. Chronic peritonitis occurs without any great amount of suffering. The symptoms are those of abdominal soreness and uneasiness, with a full but sometimes rapid pulse.

The treatment of acute peritonitis must be active—proportioned to the amount of pain, the rapidity of the pulse, and the intensity of the inflammatory fever, which is frequently marked by the peculiar depressing influence on the heart's action. The indications for general blood-letting must be gathered from the conditions mentioned at page 78, *ante*. In the milder forms, when the pain is bearable, and the pulse steady and under 100, twenty leeches over the abdomen, followed by warm fomentations, with frequently repeated grain doses of *opium*, ought to be the basis of treatment. The first indication is to relieve pain. The stomach may be unable to retain food; and vomiting may be present, when great benefit will follow the injection *per rectum* of a pint of strong meat soup *thrown up in successive portions*. Small quantities of food may then be borne by the stomach. All action of the bowels should be prevented for several days. *Opium* or *morphia* should be given as often as its effects subside—generally every two, three, or four hours. In some cases of chronic peritonitis *iodide of potassium* combined with *alkalies* I have found a most useful combination, and also *Logol's solution of iodine*, together with inunction of the abdomen with *iodine ointment*. When the abdomen can bear pressure, a flannel roller should be firmly applied round the body. *Chronic vomiting* may be relieved by effervescing draughts, combined with ♏ j. or ♏ ij. of *dilute hydrocyanic acid*, or with ♏ iij. to ♏ v. of *tinct. opii*. One or two drops of *creosote* in some aromatic water may also be useful. When diarrhœa prevails, *compound kino powder*, *catechu*, or *hæmatoxylum* may be necessary.

ASCITES.

Natural History.—A collection of serum, as a result of chronic peritonitis, slowly effused by transudation into the cavity of the peritoneum, is a form of dropsy. If the fluid effused be considerable, the abdomen is distended and the skin shining, with large superficial veins creeping over its surface. From the weight of the fluid, the gait of the patient is upright, like that of a pregnant woman; and if anasarca be present, he walks with his legs widely apart. In bed he is unable to lie down, on account of the fluid gravitating towards the chest and compressing the lungs, so that he is obliged to be raised towards the head and shoulders. The upper portion of the body is in general greatly emaciated, the sharp and pinched features and the withered arms forming a striking contrast to the protuberant abdomen and perhaps swollen legs. The urine may be defective in quantity, the skin dry, and the patient thirsty, his appetite greatly impaired, and his spirits generally greatly depressed. The presence of fluid in the abdomen is determined by percussion. Place one hand on the abdomen, and give a sharp but gentle tap on the opposite side with the fingers of the other, when, if water be present, a fluctuation will be felt. If the quantity of fluid be small, the fluctuation is best felt by percussing the side of the abdomen *from before backwards.* So long as the effusion is moderate, the shape of the belly will change with every position of the body. If standing, the lower part of the belly is prominent—if lying down, it is broad. The cause must be investigated as to whether ascites is due to—(1.) Disease of the heart, (2.) disease of the liver, (3.) disease of the kidney.

Treatment.—When no albumen exists in the urine, *bitartrate of potash*, administered in divided doses—one drachm three times a day, or every six hours, or in one large dose, as half an ounce, combined, if the patient's bowels be confined, with ten to fifteen grains of *jalap;* or, *compound jalap powder* may be given alone. When smaller doses are used, it may be useful to add ten grains of the *citrate* or *tartrate of iron* to each dose. If these remedies should fail, one-sixth to half a grain of the *extract of elaterium* every night, or every other night, may be given. When *ascites* is accompanied with *anasarca*, *squills* afford most relief; and by giving five to eight grains of the *pulvis scillæ* three times a day, the dropsy is generally relieved. If the stomach be irritable, *half a grain of opium* should be added to each dose. When ascites arises from disease of the heart, the kidney being sound, and the urine free from albumen, treatment must have reference to the nature of the heart disease. An *ounce and a half of camphor mixture, with a drachm* of the *spirit of nitrous ether*, *fifteen minims* of the *tincture of hyoscyamus*, and a *drachm* of the *sulphate of magnesia* will form a draught which, taken *three times* a day, will often greatly reduce the dropsy. So also will *tincture of squills* (♏ x. to ♏ xx.), with a *drachm* of the *acetate of potash.* Rubbing the *biniodide of mercury*, in the form of an ointment, on the skin over the region of an enlarged spleen, has a very marked beneficial effect in reducing the enlargement. The ointment is to be rubbed into the skin while the patient sits before a strong fire, or in the rays of an Indian sun. The dropsy which often occurs in young chlorotic women in whom the urine *contains albumen* (the kidney being healthy in structure though disordered in function), is generally curable,—the most efficient remedy being the *bitartrate of potash* in *drachm* doses three times a day. It acts as a diuretic and as a purgative.

CHAPTER XIV.

DISEASES OF THE URINARY SYSTEM.

A CAREFUL study of the structure and functions of the kidneys is of the greatest importance to the student of medicine in relation to diseases of the urinary organs. The determination of the quality and quantity of the *excreta* eliminated in the form of urine, is indeed one of the best methods for enabling him to determine not only morbid conditions of the kidneys, but to appreciate many changes which go on in the body during disease—changes which have frequently been referred to throughout this volume; and hence the student is advised to repeat the processes of clinical investigation into the condition of the urine, already given at page 21, *ante.*

URINARY SEDIMENTS.

Natural History.—These are sediments forming in the urine after secretion, but which may deposit in the renal passages or after emission, either in consequence of chemical changes, or from change of temperature. They consist of uric acid and urates, phosphoric acid, phosphates, and cystine.

Uric acid occurs in various combinations with bases, such as *soda*, *potash*, *lime*, or *ammonia*, and more or less coloured with urine-pigment. It is also associated sometimes with phosphate or oxalate of lime.

Uric acid sediments in their pure state occur in the form of rhombic prisms, or rhombic plates, or of thin hexagonal plates like cystine; but the most usual forms are referrible to some variety of the rhomb. Such deposits often present the aspect of a granular sand of a golden lustre, sometimes mingled with blood-discs; and generally the deeper the colour of the urine the darker is the uric acid sediment. Its appearance does not necessarily indicate that an excess of uric acid is forming in the body. The urine is generally yellow and transparent, and the acid is deposited slowly, without admixture of urates. Liquor potassæ, and also nitric acid id excess, dissolve the uric acid.

Lithuria, lithic, or *uric acid diathesis* are names which have been given to that general constitutional state in which the urates are secreted in such excess as to be deposited in inordinate quantities in the chamber-vessel on the urine cooling; or when in still greater abundance deposited in an amorphous or crystallized state, either in the cavities of the kidneys or bladder. The specific gravity of such urine varies from 1,015 to 1,035, and always gives an acid re-action, and is of a deep copper or red colour. The cause, for the most part, is referred to errors in diet, and to sedentary habits. A too full animal diet, as rich old black meats and game, are among the most frequent causes; but every substance, even the most opposite, *that causes indigestion*, will produce the deposit. Wines which are "heavy-bodied," *i. e.*, full of sugar and solids not yet decomposed by the vinous fermentation, are frequent sources of *lithuria*, and malt liquors are still worse, from the rapidity with which they ferment and turn acid. A deposit of the lithates is also incident to many diseases, as gout and rheumatism. The appearance of urates is also often a critical termination and first faint indication of recovery from fever, or severe forms of inflammation. The deposit also results from morbid states of the liver.

Nephritic colic attends the passage of a calculus from the kidney into the bladder. It is characterised by dull pains in the back and some sickness; but more commonly the attack is sudden, and the patient, perhaps in his best health, and engaged in the ordinary transactions of life, is on the instant seized with excruciating agony in the loins, with retraction of the testicle, irritation of the bladder, and often with nausea and vomiting; but in all this suffering the pulse retains its healthy frequency, and the heat of the body is natural. At length the pain intermits, and the patient has a short interval of ease. The paroxysm, however, returns more or less frequently, till relieved by the calculus having passed into the bladder.

Treatment.—The treatment of the lithic acid diathesis is by *alkalies* or *neutral salts* and *turpentine*. Half a drachm of *carbonate of potash* night and morning, gradually increasing the dose till three drachms during the day are taken. Much benefit may be derived from the *citrate of potash*, or the *common effervescing draught*. When the patient's bowels require a more active agent, the *sulphate of magnesia* or the *sulphate of soda* may be substituted. The pure alkalies, from the much smaller doses in which they can only be administered, are much less beneficial than the neutral salts. *Magnesia* also produces much less marked effects on the urine than either the *subcarbonate of potash* or *soda*. *Phosphate of ammonia*, in doses of ʒi. daily, largely diluted, is of service—especially in chronic conditions of the gouty habit. *Colchicum* (♏xv.) twice or thrice a day, followed by a saline aperient, such as *Pullna water*, is a mode of treatment often attended with advantage. Frequent use of the *Turkish bath* is of great service. Besides *alkalies*, *turpentine* has some repute in the cure of the lithic acid diathesis. Dietetic treatment is of the greatest importance. The quantity of animal food should be reduced. It is necessary, also, that Port as well as French wines should be abandoned, and those things which, according to the idiosyncracy of the patient, are likely to produce indigestion or acidity of the stomach. The patient also should be warmly clad, rise early, and take a considerable amount of exercise.

Diseases of the Kidney.

BRIGHT'S DISEASE—*Syn.*, ALBUMINURIA.

Natural History.—Several forms of acute and chronic disease of the kidney, usually associated with albumen in the urine, frequently with dropsy, and with various secondary diseases resulting from deterioration of the blood, are now known under this generic term. There exists a large amount of evidence sufficient to regard Bright's disease as partaking of the characters of a general or constitutional disease; and from this point of view it may be yet classified with gout and rheumatism, as a constitutional affection, which culminates in a variety of structural lesions of the kidneys, each of which is accompanied by the persistent separation of more or less albuminous serum from the blood, and by its presence in the urine, the connective tissue, and serous cavities of the body. The urine frequently contains blood, renal structures, exudation material, and desquamative renal products. The kidneys may be either large or small, atrophic or not, with fatty, or albuminous, or lardaceous disease, and altered in various ways as regards the blood-vessels, the urine tubes, and the epithelium. When the constitutional state associated with Bright's disease is fully expressed, there is characteristic anæmia, indicated by pallor of the countenance, a puffy face and œdematous limbs, anasarca or general dropsy, pain in the loins, with more or less albumen in the urine. There is scanty urine and frequent micturition; a sensation of heat and scalding on passing water, dryness, heat of skin, general feverishness and occasional chilliness of the surface, an irritable pulse, generally above the normal standard, emaciation, and progressive debility. Dyspeptic symptoms predominate. There is difficulty of breathing and anæmia-chlorosis. In Bright's disease, as with many others, an undue share of attention has been bestowed upon the prominent local lesions in which the existence of the constitutional state has finally culminated.

For example, the anatomical characters of *tubercle* in *phthisis*—of *cancer growths* in the *cachexia* of *carcinoma*—of the *supra-renal bodies* in *morbus Addisonii*—of the *serous effusions* into the spinal and other visceral cavities in *beri-beri*—of the *kidney* in *Bright's disease* and *mellituria*—of the sediments in the urine in *oxaluria*, *lithiasis*, and the like, have been so prominently dwelt upon, that a very narrow view is apt to be taken of the important antecedents of these diseases—of the constitutional states under which they respectively become developed, and therefore, also, of the principles which ought to guide the treatment of these respective diseases, and of the means by which their development may be prevented. This disease has been named after the eminent physician of Guy's Hospital, who, in 1837, first drew the attention of the profession to the connection which he observed to subsist between certain forms of anasarca and lesions in the kidneys.

The College of Physicians has not adopted the view which regards Bright's disease as a general or constitutional malady. It is therefore classed under "Diseases of the Urinary System;" and considered under two forms, namely—(1.) *Acute Bright's disease*, of which the synonyms are, "*acute albuminuria*," "*acute desquamative nephritis*," "*acute renal dropsy;*" (2.) *chronic Bright's disease*—syn., "*chronic albuminuria*," with the following subdivisions:—(a.) *Granular kidney*—syn., *contracted granular kidney, chronic desquamative nephritis;* (b.) *gouty kidney;* (c.) *fatty kidney;* (d.) *lardaceous kidney*—syn., *amyloid disease, waxy disease.*

ACUTE BRIGHT'S DISEASE—*Syn.*, ACUTE ALBUMINURIA, ACUTE DESQUAMATIVE NEPHRITIS, ACUTE RENAL DROPSY.

Natural History.—Bright's disease in the acute form is an intense febrile disease, which may come on after scarlatina, cholera, measles, erysipelas, alcoholic intemperance, deficient nutrition, with bodily fatigue or mental anxiety, exposure to cold and wet, and is marked by signs of intense congestion of the kidney, with exudation and hæmorrhage into the tubes, and desquamation of the epithelium. The secondary phenomena are uræmic symptoms to a greater or less degree, and in the majority of cases general dropsy. This affection seems to bear a similar relation to chronic Bright's disease that cases of acute phthisis bear to scrofula. In the rapid forms of acute Bright's disease, the products in the urine occur at first in the form of casts—a catarrhal process; so that elements closely allied to pus form in the kidney-tubes. These casts may accumulate and block up the tubes. The kidney is then enlarged, of a white colour (the large white kidney of Bright).

Acute dropsy is constant, often ascribed to cold, or as a result of scarlatina. Urine may be for a time suppressed, and the little which passes is of a red-brown colour, generally from blood. The sediment is abundant and deeply tinged with blood. It contains albumen, blood-casts, and renal epithelium. The sediment is "composed of coagulated fibrine, blood-corpuscles, cells having for the most part the character of renal epithelium, and occasionally crystals of uric acid. Some of the fibrine is coagulated in irregular masses, having no definite form: this is always the case when the hæmorrhage has been abundant and rapid, so that much of the blood has escaped from the kidneys before it has had time to coagulate; but with these masses there will be seen numerous cylindrical bodies composed of fibrine, which, having exuded from the Malpighian bodies, have coagulated in the tubes, and, escaping thence, present solid cylindrical moulds of the interior of the tubes, in which are entangled blood-corpuscles and epithelial cells, which have been shed by a process of desquamation from the surface of the tubes." Such casts, characterised by the presence of recently formed and entire epithelial cells, are known by the name of "*epithelial casts*"—their average diameter being about $\frac{1}{700}$ of an inch. Death, sometimes after only a fortnight's illness, discloses a large soft kidney, with swollen cortical substance of a dark colour, on removal of the capsules, and the surface much injected. It exudes, on section, drops of blood. To the microscope the tubes are opaque, and are filled with lymph-corpuscles and granular matter. Some have lost their epithelium, and are filled with coagulated fibrine, which, if expelled, would form a fibrinous cast.

The *urine* in the early stages and height of the disease presents intensely febrile characters. It is small in quantity, deeply pigmented, and deposits urates. It contains a variable but usually a large amount of albumen and blood. Urea is augmented, and when it appears to be below the normal amount its exit is impeded, and uræmic symptoms generally increase and prove fatal. When the urine is very scanty, it becomes almost solid by heat. When the disease is about to end fatally, the quantity of water and of the solids decrease, the diminution of the solids being more considerable than that of the water. The albumen decreases least, and is very abundant till the last. When recovery is about to take place, *diuresis* usually occurs; and often an enormous quantity of water is passed, containing much *urea* and *chloride of sodium*. The albumen at the same time diminishes and disappears, and the kidneys recover perfect health.

Treatment.—(1.) Relieve the kidneys as much as possible from the labour of elimination, by avoiding exposure to cold, by keeping the patient at rest in bed in a room of moderate and uniform temperature. (2.) The food should be scanty, consisting of gruel, arrow-root, milk, or weak broth; pure water is the best drink, and alcoholic fluids are not to be taken on any account. (3.) Free action of the skin and bowels must be maintained. The *hot air bath* and *antimonial remedies* are the best agents to effect the first of these conditions, and free perspiration is to be encouraged by bedding the patient in blankets. *Antimonial wine* may be given in doses of from fifteen to thirty drops every four or five hours. The bowels are to be kept open by the *compound jalap powder*, in doses of twenty to sixty grains, repeated daily or on alternate days. It may be alternated with *podophyllin*, or with extract of *colocynth*, and *compound gamboge pill. Mercury* is not to be given. (4.) *Cupping* over the loins relieves pain in the back, and the quantity of urine passed generally increases after eight or ten ounces of blood have been withdrawn in this way from an adult, or two or three ounces from a child three or four years old. (5.) When the tongue becomes clean and the general symptoms improve, *mutton broth* or *good beef-tea* may be indulged in; and, as the digestion improves, solid food may be eaten in small quantities, beginning with *fish* and *fowl*, and afterwards *mutton* or *beef*. (6.) *Flannel* must be worn next the skin. (7.) *Iron* is of great service during convalescence, for in such cases the anæmia becomes extreme. *Phosphate of iron* in the form of *syrup*, or *citrate of iron* and *quinia*, or the *ferrum reductum*, are the most digestible forms, and they ought to be given in small doses repeated after every diet. (8.) *Diuretics* are not to be given. *Fomentations*, consisting of *infusion of the leaves of digitalis*, may increase the amount of urine, and the amount of the albumen may diminish markedly from the use of the *tincture of the perchloride of iron.*

CHRONIC BRIGHT'S DISEASE—*Syn.*, CHRONIC ALBUMINURIA.

Natural History.—There are several different forms of lesion in the kidney associated with the phenomena of chronic Bright's disease, distinguished by certain anatomical characters, and by more or less characteristic symptoms throughout the disease. Two at least of these forms may be considered as typical and distinct; and other forms may be recognised as a commingling of these two, but not to be considered as a gradation from the one form into the other. The two forms are essentially different, and never pass by any pathological process from the one to the other.

The *subdivisions* of the lesions in the chronic form of Bright's disease. as adopted by the College of Physicians, leaves the progressive development of these lesions from one into another an open question. They are as follows:—(*a.*) Granular kidney—*syn.*, contracted granular kidney, chronic desquamative nephritis, gouty kidney; (*b.*) fatty kidney; (*c.*) lardaceous kidney—*syn.*, amyloid disease, waxy kidney; (*d.*) mixed forms of kidney lesions in Bright's disease.

It is necessary to inquire into the history of each particular case of chronic Bright's disease, so as to ascertain the precise period, if possible, when the general health began to be impaired; and in order to determine the particular morbid condition in which the kidney exists, it is necessary to make an examination of the urine from day to day, determining especially the urea and albumen, and microscopic appearances of the sediment. The general symptoms which are indicative of the several states of the kidney comprised under the general term "Bright's disease" may be comprised under the following heads:—1. Although the anasarca or general dropsy, either or both of which are usually prominent symptoms when a patient with "Bright's disease" seeks medical advice, yet in nearly every instance they have been preceded by other phenomena more or less definite—*e. g.*, febrile excitement, a dry and harsh state of the skin, a quick and hard pulse. It is only in the acute cases that the prominent and characteristic phenomena of anasarca come on with great rapidity, and commence generally with puffiness of the eyelids, or of the whole face, rapidly extending over the rest of the body. In the more chronic cases the œdema generally commences in the lower limbs; and it is at the same time associated with a pallid condition of the eyelids, and of the looser connective-tissue of the face. 2. Anæmia is another prominent phenomenon indicated by the pallor of the surface of the body and of the countenance. Its progressive appearance may even suggest a suspicion of renal disease before the anasarca sets in, especially in patients above the age of from thirty-five to forty, and whose urine ought therefore to be at once examined. 3. Pain in the loins may or may not be a sign of significance. Lumbar pains may be considerable in amount, and yet no renal disease may be capable of detection at the time. In most cases no unpleasant sensation is felt in the lumbar region till the anasarca becomes considerable. 4. In the early stages of the affection there is always a very considerable diminution in the quantity of urine passed. But there are many exceptions to the rule, and in some cases the urine is more abundant than usual. Various circumstances concur in determining the greater or less amount of water passed. The amount of albumen in the urine varies much, ranging from 5 to 545 grains in the twenty-four hours; and in any particular case the amount varies greatly from day to day. It is often increased during the day, from movement or from food, and very greatly increased in the second and third hours after dinner. In the more advanced stage of chronic Bright's disease, instead of the urine being scanty in quantity, and having a tolerably high specific gravity, the quantity passed in twenty-four hours may amount to from *thirty-five* to *fifty* ounces or more, being equal to, and in some cases greater than, the average in health. The specific gravity is nearly always below the healthy standard, the urine pale, and in very advanced cases almost colourless. Occasionally it may be red, reddish-brown, pale smoke-brown, or "smoky," as it is commonly described. If the urine is highly fatty, it may have a milky appearance. The specific gravity may range from 1020 to 1025, from two causes, namely—(1.) The presence of serum, which is heavier than urine; (2.) from the small amount of water (relatively). 5. There is nearly always a frequent desire to micturate, especially at night, when the patient is in the horizontal posture, with a sensation of heat or scalding on passing water, accompanied with a discharge of mucus from the urethra, which possesses a more or less puriform character, and appears in the urine in the form of slight thin shreds. 6. Dryness of the skin prevails, and the power of eliminating water by the skin seems impaired. Heat of skin and general feverishness, with occasional chilliness of the surface, and a pulse generally above the natural standard, are common phenomena throughout the later stages of the disease, and when emaciation and debility are progressive. 7. The *dyspeptic symptoms* which prevail at an early period indicate irritation of the gastro-intestinal mucous membrane. Loss of appetite, sometimes amounting to actual loathing of food, or a capricious and uncertain appetite, are amongst the most prominent phenomena. The food taken rests uneasily in the stomach, giving rise to stomachal and intestinal *pneumatosis* and acid eructations, the explosive force of the gas so generated being sometimes so great as to cause partial regurgitation of the food. Gastralgia and pyrosis may prevail; and there is very often nausea, retching, and sometimes vomiting, at occasional intervals. Attacks of diarrhœa are frequent, alternating with costiveness—symptoms referrible to the state of the blood. 8. *Dyspnœa* is one of the earliest and most pathognomonic phenomena of chronic Bright's disease; and this shortness of breath is quite apart from, and independent of, any bronchial catarrh or disturbance in the first instance. The patient observes every now and then how short his breath has become. In an ordinary walk he finds he must stop to recover his breath. Occasionally the attacks occur at night, but chiefly during the day, and there is more or less palpitation during the paroxysms; while some wheezing at the chest may also attract the patient's notice. Weeks are thus apt to pass before the patient considers the symptoms sufficiently grave to seek medical advice. If the urine be examined at this early period, the presence of small quantities of albumen may be detected, and the sediment will contain granular casts, with more or less decayed cell-structures. Another cause of dyspnœa is the œdema which is apt to set in and pervade the base of more dependent parts of the lungs. It must also be remembered that the lungs, the pericardium, and pleura are organs especially liable to the intercurrent attacks of inflammation in Bright's disease. 9. Symptoms referrible to the nervous system prevail.

The specific gravity of the urine, the albumen it contains when persistent, and the amount of the solid constituents, are the first indications of the real nature of the disease. To determine the albumen, a small quantity of the urine in a test-tube must be slowly and gently heated to the *boiling* point by the flame of a spirit-lamp, when, if albumen is present, it will appear in the form of a whitish cloud, of which the constituent particles multiply and collect, in proportion as the quantity is considerable, into small curdy fragments or flakes. These will gradually subside to the lower part of the tube when permitted to rest, leaving the supernatant liquor clear, and so indicate approximatively the amount of albumen present. A second specimen of the urine should be taken in another tube, and, after it has been thus boiled, an excess of *nitric acid* may be poured into the tube, when the albumen present will be precipitated in a flaky or pulpy form. This latter method is the best where the urine to be tested is alkaline; but both methods should be employed in every case; and they are sufficient to determine the presence of albumen. The quantity of albumen present is an important point to be considered, along with the characters of the tubular or organic elements contained in the urine ; and in private practice the amount of albumen passed is approximatively judged of by noting the *space* which the *coagulum* occupies in the tube after being allowed to rest. The phraseology recommended by Dr. Chirstison to express the proportions observed by the eye is as follows:—1. *Gelatinous* by heat. 2. *Very strongly coagulable* by heat — nearly the whole tube. 3. *Strongly coagulable*—half the tube. 4. *Moderately coagulable*—one quarter of the tube. 5. *Slightly coagulable*—one-eighth. 6. *Feebly coagulable*—less than one-eighth. 7. *Hazy* by heat—no visible flakes of albumen.

When the disease is established, and its diagnosis confirmed, much information will be obtained as a guide to treatment, and as an aid to the diagnosis of the peculiar morbid condition in which the kidney may be, by a daily microscopic examination of the urinary sediments.

The following is a general summary of results relative to casts in the urine in Bright's disease:—*The blood casts* represent more or less active hyperæmia and hæmorrhage from the kidney. *The coarsely granular epithelial cast*, with its compound inflammation-corpuscle, accompanied by amorphous granular flakes stained with hæmatin, represent the period of inflammatory exudation. *The finely granular semi-transparent casts*, with scattered epithelium and granule-cells, represent the period of subsidence of the inflammatory process. *The transparent casts*, with compound cells, or with isolated transparent molecules and grape-like clusters of granules, represent a stage of chronic subacute disease of very grave import; and if these casts become more and more loaded with large and gradually increasing fat-granules and oil-drops, the progress of fatal fatty degeneration is clearly marked.

Deteriorating conditions such as have been here described are not limited to the kidney in Bright's disease. There is reason to believe that the nutrition of most of the textures and organs of the body proportionally fails; and although not so apparent, because not manifested in a manner capable of being demonstrated during life, yet the tissues of every organ become more or less degenerate and inefficient for the purposes of life. The cells of the liver are invariably loaded with an abnormal amount of fat in all fatal cases of Bright's disease; and the heart-fibre and arterial textures exhibit the microscopic characters of atrophy and granular or fatty degeneration. Inflammation of the serous surfaces is a common complication.

Treatment.—Every case requires a special study, and a line of treatment in detail, based on its individual history. A long time is necessary before any appreciable results are obtained, and therefore it is necessary to persist in one line of treatment steadily from week to week, and even from month to month. It is obviously of great importance, to be as accurate as possible in diagnosis as to the probable state of the kidney, so as to define the line of treatment from the first which may seem best adapted for the individual case. It is a question of very grave importance how far vomiting or diarrhœa ought to be checked. If either of these occurrences are suddenly stopped (the gastric and intestinal membrane acting at the time as an emunctory for the urea and other excreta of the urine), the patient may be suddenly cut off by convulsions, apoplexy, or effusion into some of the serous cavities, such as the pericardium, or the pleuræ, or the ventricles of the brain. It is necessary, therefore, in the first instance, to determine in all chronic cases the particular organ or tissue which seems in each case to be acting vicariously. The perspirations are often spontaneously profuse; and the skin is by far the safest emunctory for the vicarious elimination of urinary constituents. Therefore it is important to promote the action of the skin if it be deficient, and to encourage it even if it is already considerable. *Diaphoretics* are always of essential service. So it is also safe to promote the discharge of secretions from the intestinal canal, with due caution that they do not become excessive, so as to pass into persistent diarrhœa. Urea and other constituents of the urine are found in such discharges in large proportions. When general anasarca prevails, absorption may be promoted by *gentle pressure*, which at all times must be very cautiously applied, and the effects closely watched, for such effusions afford great temporary relief to important symptoms which indicate the involvement of vital organs. *Bandaging* to promote absorption is not justifiable so long as the anasarca is increasing. Patients ought to be encouraged to go about as long as they are able, care being taken that they are clothed with *flannel* and *woollen garments*, and otherwise well protected from cold. The quantity of urea passed by the urine should be determined daily, to ascertain how far the kidneys are capable of secreting and eliminating these excrementitious products. According to the results obtained, the diet must be regulated, and such measures taken as are calculated to reduce the quantity of urea, and other constituents formed daily, to the capacity of the diseased kidneys for the work they are able to do.

The complications of Bright's disease are extremely difficult to manage. The *diarrhœa* must not be suddenly checked. Thirty to sixty minims in water of the *spiritus ammoniæ aromaticus*, with half a drachm of the *tincture of kino* or of *catechu*, after every loose stool, will in general be all that is necessary. If there be much griping, the application of a *linseed poultice* over the abdomen, with two drachms or half an ounce of *tincture of opium* sprinkled over it, will give relief.

Intercurrent inflammatory attacks and effusions into cavities are still more difficult complications to manage, and are very dangerous to life.

Bronchial complications are serious, and more or less constantly present. They are frequently the immediate cause of death in chronic Bright's disease. The least stimulating *expectorants* are to be administered under such circumstances. If the expectoration be viscid, and difficult to discharge, a few drops of *antimonial wine* may be added to the draught; or if there be much spasm of the bronchial tubes, as indicated by the asthmatic breathing, a few drops of *sulphuric* or *chloric ether* may be given. If, on the other hand, the expectoration be purulent and difficult, a *few grains of carbonate of ammonia* may be given with the *oxymel of squills. Flannel* next the skin must be invariably insisted on.

SUPPURATIVE NEPHRITIS.

Natural History.—Inflammation with suppuration of the substance of the kidney occurs in two essentially different forms,—(1.) Parenchymatous nephritis; (2.) Interstitial nephritis; and these may be complicated with fatty degeneration or lardaceous disease. All forms of disease may be present at once, sometimes one and sometimes another occurring first: but *parenchymatous nephritis* is most generally the primary affection. *True parenchymatous nephritis* is a hypertrophy or "cloudy swelling" of the large cells of the convoluted tubes. The cells take up large quantities of the *albuminates*, becoming distended, turbid, granular, and closely adherent to each other. Subsequently all the cell-forms vanish, and a large granular fatty mass is set free, which generally forms into "inflammatory globules." It often co-exists with "interstitial nephritis." When catarrh exists, it is usually associated with the symptomatic phenomena of Bright's disease. Sometimes the whole of the new interstitial material undergoes the fatty degeneration. Granulations are also formed by the connective-tissue contracting round the canals and glomeruli, and circulation is more or less obstructed. The tubes become constricted in a bead-like manner, and the *tunica propria* is thickened and streaked. The glomeruli become small, homogeneous, and more or less fatty. *Circumscribed interstitial nephritis* often affects the pyramids only, as a result of syphilis; nodes are the consequence, which, passing away or diminishing, leave cicatrix-like depressions not unlike those from hæmorrhagic infarctions. The kidneys may suppurate—(1.) From morbid conditions of the blood; (2.) from external violence; (3.) from retention of urine; (4.) from calculi in the kidney; (5.) from softening of fibrinous infarctions, the result of embolism. These are wedge-shaped well-defined masses of fibrine, the bases towards the kidney surface. The term "*infarction*," as originally used by the older anatomists, implied stuffing up combined with hyperæmia and congestion. Such infarctions are more frequently absorbed, and rarely proceed to suppuration. When the kidneys are inflamed, more or less pain is felt in the region of these glands, and the pain commonly shoots along the ureters. There is a sense of numbness down the thigh, and in the male there is often retraction of the testicle, or a feeling of pain in it. When one kidney is affected, these symptoms are only felt on that side. The urine is voided frequently, and is sometimes of a pale, but more commonly of a deep-red colour. There is sickness and vomiting. The bowels are at the same time often costive, and subject to colicky pains. These symptoms are accompanied by more or less fever. When pus is formed, the event may be known by the pus being mixed with the urine.

If nephritis passes to a chronic suppurative state, the pain in the loins is often severe and the appetite impaired, while pus is found often to a considerable amount in the urine, and if a calculus or gravel be the immediate cause, the urine may contain large portions of those substances mixed with blood.

HÆMATURIA.

Natural History.—Hæmorrhages in which blood is mixed with the urine, whether it proceeds from the kidney, ureter, or bladder are known by this name. The most usual organic diseases with which hæmaturia is complicated are, *Bright's kidney*, especially *acute desquamative nephritis*, *fungus hæmatodes*, either of the kidney or bladder, *nephritic* or *vesical* calculi, and cancer of the bladder. It may also owe its existence to parasites or their ova in the bladder. Dr. John Harley has described a form of hæmaturia in connection with the occurrence of the *distoma hæmatobium.* Its ova are then found in the urine; and its occurrence is endemic in Egypt, South Africa, and the Mauritius. Intermittent hæmaturia is now a recognised morbid condition generally associated with malaria.

Treatment.—*Tincture of the perchloride of iron* is one of the most useful of remedies, whether in debilitated patients or in those suffering from Bright's disease, and whether the blood comes from the kidneys or bladder. It is best given in doses of ♏x. to ♏xx., three or four times daily, in combination with *glycerine;* and if there be much *cardiac* difficulty, with arterial excitement, it may be combined with *digitalis. Quinine* and *arsenic* are the remedies indicated in malarious intermittent cases. Hæmorrhage often readily yields to *bitartrate of potash* or to the *mineral acids*, and to *turpentine* in ♏x. to ♏xx. doses every two or three hours, in mucilage. Injections of cold water, or water in which twenty to forty grains of *alum* have been dissolved, into the bladder or up the rectum, and also a cold hip-bath, are of benefit.

SUPPRESSION OF URINE—*Syn.*, ISCHURIA RENALIS.

Natural History.—A complete or partial suspension of the functions of the kidney, by which the quantity of urine is greatly in defect, or its secretion entirely suppressed. There may be some pain in the back, or some irritability of the bladder; the patient becomes anxious and restless, till at last the brain is oppressed, and he dies comatose. In other cases there is nausea, hiccough, and the body exhales an urinous odour. When the suppression is less complete, and depends on an affection of the bladder, the local sufferings of the patient, the forcing of the bladder, the tenesmus, and the general irritation are most severe and distressing.

The time during which the urine may be suppressed, and yet the patient recover, is various. In hysteria the urine is often suppressed for three or four days—three, four, to ten days are the extremes. Children when teething may sometimes void only a few drops of urine, and that at several hours' interval. The urine passed at such times is extremely high coloured, stains the linen, and is passed with great pain, the child crying bitterly as it scalds the surface over which it flows.

Treatment.—When suppression does not depend on any morbid condition of the blood, and is primary, the patient should be placed in a warm bath, and be purged by substances that act on the kidney, as the neutral salts. Indeed, if the case be slight, purging by any cathartic is sufficient. If this method should not succeed, ♏x. to ♏xxx. of the *tinct. cantharides* should be tried every four or six hours, according to the urgency of the case. *Belladonna* is also a useful remedy, and so is *digitalis* applied as a fomentation of the fresh leaves over the abdomen; or an ounce of the tincture may be added to a warm *linseed poultice;* or the dried leaves may be made into a poultice, to which half an ounce of the tincture may be added. It is chiefly cases in which the pulse is rapid that *digitalis* is suitable; and the urine will not begin to flow till the *digitalis* has reduced the action of the heart. ℞. *Tinct. Digitalis*, ♏v. to ♏x.; *Spr. Æther nit*, ♏xxx.; *Liq. Ammon-Acet.*, ♏lx.; *Aq. f*℥i.; *misce.* Such a draught may be taken every three or four hours.

Diseases of the Bladder.

Cystitis—*Syn.*, Catarrh of the Bladder.

Natural History.—Inflammation of the urinary bladder may be diffuse, serous, adhesive, suppurative, or ulcerative, and either *acute* or *chronic.* The inflammation may extend over its whole cavity, or be limited to some portion of it, and the part most frequently inflamed is that near and around the neck of the bladder. In this respect it follows the law of all hollow organs, namely, that it is most liable to be diseased at its orifices, as being liable to the occasional extension of inflammation from the urethra. It often terminates in suppuration, and pus to a considerable amount may then be passed.

The *symptoms* of inflammation of the bladder are pain felt in the perinæum and above the pubes, accompanied with a fulness or swelling, also frequent attempts to make water, which is evacuated in small quantities and with great pain, or there is a total retention of urine, with a strong desire to void it. The rectum, from its connection with the bladder, is affected with tenesmus, and the stomach likewise takes part in this disease, being affected with nausea or vomiting. In some cases these symptoms are accompanied with much constitutional irritation and by delirium. When pus is formed, it will be seen mixed in the urine evacuated.

Treatment.—Purging, together with *opiates*, *diluents*, and the *warm bath* are the best means of cure. *Opium* is the remedy of the greatest value, especially aided by the *hot sitz baths*, *hot fomentations* over the abdomen, and *linseed-meal poultices*, with or without *mustard* or *turpentine*, over the hypogastric region. *Suppositories of morphia* are also of great use, containing half a grain to a grain of opium; but if the pain be very great, as much as two to four grains of *opium*, with ten to fifteen grains of *extract of hyoscyamus*, in a suppository at the hour of sleep, has been found necessary. *Alkaline* and *demulcent drinks* should be at the same time given. The state of the urine is perhaps one of the surest guides in our attempts to cure the patient; and if the urine be acid, the best medicines are the *neutral salts* or the *pure alkalies*, with *opiates;* while if the urine be alkaline, or greatly loaded with mucus, the *mineral acids* are of the most service, combined with an opiate. *Tonics* often succeed; and of these *salicine* is one of the best, given in doses of ten grains every six hours; and in chronic catarrh, when the discharge is copious, the decoction of *uva ursi*, in doses of not less than half a pint daily, is very soothing.

CHAPTER XV.

DISEASES OF THE CUTANEOUS SYSTEM.

SECTION I.—CLASSIFICATION OF DISEASES OF THE SKIN.

THE expressions of skin diseases are various in appearance, and the same disease does not always exist in the simple or elementary form in which it first appeared. The classification of skin diseases hitherto in use is that which is comprehended in the eight orders of Wilian and Bateman; and the characteristics of these orders are embraced in the following definitions of terms in common use in the description of skin diseases:—

Order I. Pimples.—*Papulæ* are simple solid acuminated elevations of the cuticle, resembling an enlarged *papilla* of the skin. They commonly terminate in a scurf, and sometimes in slight ulceration of its summit.

Order II. Scales.—*Squamæ* consist of cuticle in patches, plates, or laminæ, in which the epidermic cells are morbidly adherent, hard, thickened, whitish, and opaque. These scales cover either small papillæ, red elevations, or larger deep red and dry surfaces.

Order III. Rushes or Rashes.—*Exanthemata* are superficial red patches of irregular size, and variously diffused. They disappear under pressure, and terminate by desquamation.

Order IV. Blebs.—*Miniature Blisters—Bullæ.* They differ from vesicles in size, being larger. A large portion of cuticle is detached from the skin by the interposition of a watery fluid, usually transparent. The skin is red and inflamed beneath the blebs.

Order V. Pustules.—*Pustulæ* consist in circumscribed elevations of the cuticle, and contain pus. They have red and inflamed bases, and are succeeded by an elevated scab, which may or may not be followed by a cicatrix.

Order VI. Vesicles.—*Vesiculæ*—small acuminated or orbicular elevations of the cuticle, containing lymph, which, at first clear and colourless, may become amber-coloured, opaque, or pearl-like. Vesicles are succeeded by a scurf or a laminated scab.

Order VII. Tubercles.—*Tuberculæ*—small, hard, indolent elevations of the skin, sometimes suppurating partially, sometimes ulcerating at their summit.

Order VIII. Spots.—*Maculæ* are permanent discolorations or stains of some portions of the skin, often with a change of structure. They may be whitish, dusky, or dark.

Clear and accurate in detail, these anatomical definitions have not yet been surpassed, and have laid the foundation of the objective study of cutaneous diseases. They have given the key to most of the recent classifications of cutaneous diseases, which are therefore mainly anatomical.

SECTION II.—DESCRIPTION OF THE MORE COMMON DISEASES OF THE SKIN.

ERYTHEMA.

Natural History.—Uniform redness simply, with puffiness of the skin, distributed in distinct patches of some size, is accompanied by little constitutional disturbance; and if febrile phenomena are decided, it may betoken more severe inflammation of areolar tissue than *erythema*, and a more grave disease. It is thus apt to be mistaken for *erysipelas.* The varieties are—*E. læve*, *E. fugax*, syn., *E. volaticum*, *E. marginatum*, *E. papulatum*, *E. tuberculatum*, *E. nodosum.* Of these varieties *erythema nodosum* is perhaps the most important. The indisposition which precedes the eruption is generally associated with a slight degree of fever. Red oval patches, considerably elevated and very tender, appear on the fore part of the legs, sometimes on the arms; and the long diameter of these patches is generally parallel to the axis of the limb on the anterior aspect of the leg, forming bumps an inch and a half long and an inch broad. After a few days the red colour changes to blue, the patches become soft, and although something like fluctuation may be felt, suppuration does not occur. The bumps gradually subside. The disease is seen in feeble boys; but it is most common in young women, associated with disordered menstruation or with rheumatism.

Treatment.—*Rest* and *quinine*, after aperients. *Carbonate of ammoniæ*, after gentle purgation, is also of benefit, in doses of five to ten grains three times a day. *Oxide of zinc*, in fine powder, dusted over the surface, will allay local irritation.

URTICARIA—*Syn.*, NETTLE-RASH.

Natural History.—An eruption of little solid elastic eminences, roundish or oblong, pale in the centre, and red at the circumference, commonly called "wheals," similar to what results from the mark of a lash, attended with an intense heat, a burning, tingling, or pricking sensation, very much like that produced by the stinging of a nettle, and hence the name. The several varieties are—(*a.*) *Urticaria acuta*; (*b.*) *Urticaria chronica.* The acute forms are generally connected with the ingestion of some kinds of food. The more chronic and intermittent forms are often associated with uterine or ovarian affections.

Treatment.—*Emetics* and *purgatives* in the first instance; afterwards the correction of faulty digestion. The surface of the eruption may be dusted over with flour; or a lotion of *carbonate of ammonia* and *acetate* *of lead* may give relief. Acid applications, such as the juice of a lemon, are also soothing in some cases. In the chronic form, especially associated with uterine irritation or ovarian tumors, I have found *bromide of potassium* of much benefit. It ought to be given in full doses of ten grains twice daily, to be doubled at bed-time. *Quinine* is also useful in many cases combined with *rhubarb* and *carbonate of ammonia*, *hyoscyamus* or *belladonna;* although *belladonna* sometimes produces urticaria.

LICHEN.

Natural History.—An eruption commencing as small red papulæ, either isolated or confluent. These becoming excoriated, give vent to a serous fluid in considerable abundance, which ultimately concretes into a crust. Sometimes regarded as a form of *eczema*, it includes five forms or varieties,—(1.) *Lichen simplex;* (2.) *Lichen pilaris;* (3.) *Lichen circumscriptus;* (4.) *Lichen agrius;* (5.) *Lichen tropicus*—syn., *Prickly heat.* If the summits of the papulæ become torn by the nails in scratching, yellow or blackish crusts form, due to the mixture of blood and serum, and abrasions of the skin occur. The disease is then known as *prurigo* (*eczema lichenoides* or *eczema pruriginosum*). It occurs more or less in all chronic cases of *scabies* or *phthiriasis*, and sometimes in *urticaria.* The disease attacks by preference the scrofulous and the debilitated, and is especially associated with improper, insufficient or bad food, a too liberal diet, and stimulants in food or drink, exposure of the skin to the heat of the sun, or to acrid substances. Fissures of the skin are a most frequent complication, and occur in those situations where the skin is naturally thrown into folds, as at the arms, the angles of the mouth, the joints, the palms of the hands, and flexures of the fingers—bleeding and causing excruciating pain. When deep, the fissures are red and raw-looking, and serum or blood exudes from them, giving rise to crusts, which partially fill them up.

Treatment.—*Glycerine* externally and the *alkalies* internally and externally are of service. *Bicarbonate of soda*, in fifteen grain doses in some bitter infusion, is to be increased by eight grains daily, till ʒi. is taken in the twenty-four hours. *Alkaline baths* and *lotions* are to be used at the same time—the lotions containing two to three drachms of an alkaline salt to twenty ounces of water.

PSORIASIS.

Natural History.—An eruption characterised by the development of irregularly formed patches, slightly raised above the level of the skin, and covered with thin, dry, white scales. The patches may be distinct, small and scattered; or larger, confounded together, and irregular; or they may be so extended as to make a continuous surface. Hence the names of varieties of psoriasis—(a.) *psoriasis vulgaris;* (b.) *guttata;* (c.) *diffusa;* (d.) *gyrata;* (e.) *inveterata.* The intense itchiness and the eruption are always preceded and accompanied by that form of dyspepsia or impaired digestion in which there is a superabundance of acidity, much formation of lithates, and an obvious constitutional tendency to gout. Anæmic persons, and those in whom the circulation is languid, with a dry skin, are those in whom the disease is prevalent. Sometimes it is localised in patches, as on the back, between the shoulders, the lips, the eyelids, the palms of the hands, the scrotum, or the pudenda.

Treatment.—Preparations of *arsenic* are found to be of great service in this form of eczematous inflammation; and it is of the greatest importance that the meals and the diet should be regulated. Small doses of *pilulæ hydrargyri*, or of *pilulæ calomelanos compo.*, or *hydrargyrum c. cretâ*, may be given at bed-time for a few days, followed each morning by a *drachm of magnesia*, given in combination with a tea-spoonful of *lemon-juice.* The vascular excitement of the stomach is best subdued by *dilute hydrocyanic acid.*

The tone of the stomach is then to be restored by small doses of *bicarbonate of potash*, with from twelve to fifteen minims of the *tincture of henbane*, in a fluid ounce and a half of the *infusion of cinchona.* The eruption and itching disappear as the mucous membrane of the stomach and bowels returns to a healthy state. The diet should be absolutely free from stimulants; and tepid baths, used every morning for half an hour, are most serviceable—the bowels being regularly relieved.

HERPES.

Natural History.—This cutaneous lesion is expressed by red patches, of irregular form and variable size, upon each of which there arises a group, cluster, or crop of extremely minute vesicles.

This is one of the most interesting of cutaneous lesions; for at present its associations, on the one hand, are with *neuroses*, and, on the other, with specific *exanthemata;* but it seems really as much of a disease *sui generis*, as any with which we are acquainted. In some cases, on the one hand, it is an instance of an inflammation of the skin produced directly by nervous influence. It is then not a disease of the skin, but merely a local lesion, to be regarded as a sign or symptom of disturbance, beginning at some part of a nerve-trunk or possibly in the very nerve-centres themselves. The varieties of *herpes* mentioned by the College of Physicians are—(a.) *Herpes phlyctenodes;* (b.) *Herpes cir-*

cinatus; (c.) *Herpes iris;* (d.) *Herpes zoster*,—syn., *shingles*, *zonaignea*, *cingulum.*

The phenomena of *herpes*, *zoster*, or *shingles*, are as follow:—A certain belt of skin on one side is felt to be tender and painful, but when looked at nothing is to be seen, the skin is not even red. Next day, however, or sooner or later, red points may be seen arranged in long oval groups on the painful parts, and very quickly each point shews a small clear vesicle. The vesicles at first are beautifully pellucid, and very often a number are heaped together, not positively confluent, for divisions between them may still be seen, but much in the manner that a number of hills constituting one range are piled together. At a later stage the vesicles may contain a blood-stained serum, and later still opaque pus. The groups of *herpes* are on one side of the body only. If the area of the terminal branches of the fifth nerve are affected, then the eruption appears on the one side of the forehead, or side of temple, eyelid, side of the nose, or upper lip; if one of the intercostals, then it appears on one side of the chest or abdomen: and so of the two extremities. The constitutional disturbance is rarely more than the pain will account for; but the eruption is often preceded by considerable local pain, or by cutaneous pain over the region which is to be the seat of eruption, or by pain resembling neuralgia in neighbouring or even distant parts, and which may continue after the eruption has disappeared. It runs a very definite course, and, when not interfered with, its development and defervescence is completed in about ten days. Now and then the patient has a slight rigor before the attack. The disease occurs at almost any age, and in either sex; and no special condition of general ill health can be stated as predisposing to an attack of shingles. It is not contagious, and does not occur twice in the same person. The eruption is rarely, if ever, symmetrical; but syphilitic rashes have sometimes been known to resemble *herpes zoster*, and so give rise to the belief that it is symmetrical. It occurs with equal frequency on the two sides of the body.

Treatment.—Dry applications, such as enveloping the parts in *cotton wool* after sprinkling with *oxide of zinc* in fine powder or with *starch*, I have always found better than wet applications. *Tincture of aconite* and *tincture of opium* have been applied to relieve the severe intercostal pain. The intolerable burning has been relieved by painting over the vesicated patches with *collodion.* It tends to prevent the rupture of them, and so tends to prevent ulceration, by promoting healing of the parts under a scab when inflammation has subsided. The state of the stomach and digestive organs, and diet generally, should be regulated. *Malt liquors* should be avoided; and, if pain is severe, *opiate fomentations* may be applied. *Herpes preputialis* requires no treatment beyond careful ablution with tepid water, and the interposition of a piece of wet lint between the *prepuce* and the *glans penis.* If there is much pain, the lint should be moistened with a watery solution of *opium.*

PEMPHIGUS—*Syn.*, PEMPHLOX.

Natural History.—An eruption of large vesicles, filled with serous fluid, known as bullæ, which vary in magnitude, and are generally distinct and numerous. They spring up in successive crops, generally in the forearms and legs, surrounded by redness of the skin. The vesicles, originally transparent, gradually become opaque, pearl-coloured, and ultimately of a pale red colour. The following varieties are to be distinguished:—(a.) *Pemphigus acutus;* (b.) *Pemphigus chronicus;* (c.) *Pemphigus solitarius;* and (d.) *Pemphigus foliaceous. Pemphigus foliaceous* commences on the front of the chest, and when fully developed covers the whole body. It is almost always fatal.

Treatment.—Dietetic and tonic, especially by *quinine* and the *mineral acids. Arsenic* is said to be of use in obstinate cases, improving the general health. Emollient *lotions*, with, or without *opium*, are useful local applications; also enveloping the affected parts in the white vulcanised india-rubber cloth.

ECZEMA.

Natural History.—An eruption characterised by—(1.) Infiltration of the skin; (2.) exudation on its surface; (3.) the formation of crusts; (4.) itching. Eczematous skin feels thick when pinched up into a fold. It has a doughy feel, and on pressure the redness disappears, and shews a yellowish hue. The exudation is watery, sometimes purulent, and sometimes mixed with blood. It stains and stiffens underclothing with which it may come in contact. The exudation becoming concrete forms crusts, and their appearances vary with the character and nature of the exudation. The itching is always aggravated by touching the part, and still, at the same time, an irresistible desire to scratch is excited. Scratching is sometimes thus persevered in till blood flows from the part. The disease is thereby greatly aggravated—a copious eruption of newly formed vesicles and fissures being apt to form. The elementary lesions of the skin in eczema are—(1.) An erythematous state; (2.) vesicles; (3.) pustules; (4.) papules; (5.) fissures; (6.) a mixture of several or of all of those lesions; and in the fully expressed disease there may not be the merest vestige of either a vesicle, a pustule, or a papule; but the skin is red and smooth on the surface, having a brilliantly polished and shining appearance, the tissue being loaded with infiltration. The vesicles, when they occur, are usually developed at the orifices of the cutaneous follicles. They are small and closely set together; they usually rupture early, and the serosity concretes into crusts. The more the skin is infiltrated the less likely are vesicles to be seen. In the absence of vesicles, when the disease is at its height, the infiltrated patches are red and inflamed. The redness is not uniform: it is studded with innumerable points of a deeper red, giving a punctated appearance to the part. There are certain localities where eczema is most apt to occur—the head, the hairy portions of the face, the lips, the edges of the eyelids, the nostrils, the lips, the external auditory passages and ears, the hands, feet, legs, genitals, perineum, *mammæ*, umbilicus, and parts of the skin which are naturally in contact with one another.

The forms of *eczema* recognised by the College of Physicians are,—(a.) *Eczema simplex;* (b.) *E. rubrum;* (c.) *E. impetiginodes;* (d.) *E. chronicum.* Practically, a papular, a vesicular, a pustular, a weeping, and a squamous condition of eczematous lesions are to be recognised.

Treatment of eczema must be constitutional in the first instance; and local applications suited to the nature of the part affected are to be carefully used. Derangements of the digestive organs must be especially rectified. If the tongue is loaded, the appetite bad, the liver torpid, as indicated by light clay-coloured evacuations and costive bowels, small doses of *grey powder* in combination with *quinine* are indicated—the dose being so adjusted that the patient has at least one full natural evacuation daily. Occasional doses of *calomel*, alone or in combination with *scammony*, will stimulate the torpidity of the digestive organs; and at the same time the cutaneous inflammation will diminish. If the patient is a full feeder, and will not be persuaded to live more sparingly, *one drachm to two drachms of the sulphate of magnesia* may be given twice daily, with *a sixth to half a grain of tartar emetic* added to each dose. The effect of this remedy will be to diminish desire for food, and at the same time keep the bowels freely open. If the patient is scrofulous, or debilitated from insufficient food, or food not nutritive enough, more nourishing food must be given, combined with tonics containing *iron* and *cod-liver oil.* Children a few months old, reduced to "skin and bone," recover wonderfully under the influence of twenty drops of the syrup of the *iodide of iron* in a tea-spoonful of *cod-liver oil*, repeated three times daily, the dose of the oil being gradually increased to a table-spoonful. *Syrup of the phosphate of iron,* or of the *phosphates of iron*, *quinia*, and *strychnia*, should be alternated with the *iodide of iron.* and the treatment must be steadily maintained for at least six weeks or two months. *Cod-liver oil* and *iron* are almost equally serviceable to eczematous adults. When there is a difficulty of taking it in its pure state, the emulsion of it will often be found useful;—when the appetite is very deficient, a pure tonic, such as *quinine* and *aromatic sulphuric acid*, is to be given. *Soft soap*, *potash lotions*, *camphor* and *zinc*, in the form of ointment with *glycerine*, are the best local applications.

ECTHYMA.

Natural History.—An eruption of large round pustules, generally distinct, and seated upon a hard inflamed base. The pustules are succeeded by dark-coloured scabs, which leave superficial cicatrices behind them, or red stains, which disappear after a time. The eruption is common on the neck, shoulders, buttocks, extremities, and chest; and is seldom developed on the face and scalp. The typical appearance of ecthyma may be seen in the pustules produced by friction with *tartar emetic* ointment.

Treatment is chiefly by *diluents*, *simple* and *emollient baths*, and regulation of *diet*. Moderate exercise should be taken, combined with the use of *akaline* or *salt water baths*. *Mild laxatives* are beneficial, and *spirits*, *wine*, and *beer* are to be refrained from. The food should be as nourishing as can be digested. Tonics, such as *quinine* and *iron*, are also indicated. A stimulating lotion, composed of *muriatic acid* diluted with water, is of use to brush over the parts and promote cicatrisation. Specific treatment must be adopted when the disease is associated with *syphilis*.

ACNE.

Natural History.—Inflammation of the sebaceous glands and hair follicles of the skin generally, or those at the roots of the hairs of the beard, is generally produced by local causes of irritation. The eruption appears as pimples; but usually suppuration very slowly follows: and there may be persistent redness after suppuration is at an end, giving a blotchy appearance to the part. The temples, cheeks, nose, and forehead are the parts most frequently affected; but it also appears on the neck, shoulders, and front of the chest. The first occurrence of the disease is often indicated by a collection of morbid material in the sebaceous follicles, which open on the skin by a blackish point (*comedo*), to which the vulgar give the name of "*grubs*" or "*worms*" *in the skin*. The accumulation of the matter secreted by the sebaceous follicles tends to keep up an eczematous inflammation in them. The lesions of *acne* recognised by the College of Physicians are —(a.) *Acne punctata*; (b.) *Acne indurata*; (c.) *Acne rosacea*; (d.) *Acne strophulosa*—syn., *Strophulus albidus*.

Treatment.—Local and general measures require to be combined. *Diet*, in the first instance, should be restricted. *Wine*, *spirits*, and *coffee* are to be refrained from. *Milk* is to be used as a drink, and as an article of diet, combined with light food, fresh vegetables, and succulent ripe fruits. Emollient application, such as an *emulsion of bitter almonds*, a decoction of *bran* or *quince seeds* and *tepid milk*, are useful to promote resolution of the induration; *iodide of sulphur*, in the proportion of *fifteen* or *twenty-four grains to an ounce of lard*, is of great service in dispelling the tumors. Drastic purgation ought to be avoided. *Simple baths* at a temperature of 88° or 90° Fahr. are of service.

SECTION III.—PARASITIC DISEASES OF THE SKIN.

TINEA TONSURANS—*Syn.*, RINGWORM.

Natural History.—An affection implicating the hairs of the skin, scalp, or chin, and usually assuming a circular form. The hairs become dry and brittle, having a tendency to crack or break across. Itching accompanies the primary eruption, which is generally at first erythematous, with slight swelling, and a parasitic fungus ultimately appears (*Achorion Lebertii—Trichophyton tonsurans*), which had been developing between the epidermis and the true skin. The fungus has a pure white colour and powdery aspect. It covers the epidermis between the hairs, and forms around them a complete white sheath. Inflammation of the hair follicles and of the surrounding tissues occurs; and when pus forms, the fungus is destroyed at the expense of obliteration of the roots of the hair, when perfect baldness ensues. The crpytogamic parasite called the *Achorion Lebertii* (*Trichophyton*) consists of oval transparent spores or globules, about the $\frac{1}{7000}$ part of an inch in diameter. Many of these are isolated; others constitute, by their juxtaposition, articulated filaments. Comparatively few cryptogamic tubes are visible—a character which distinguishes the ringworm affections from the vegetable structures seen in the other parasitic diseases of the skin. Its anatomical seat is in the *interior of the roots of the hair*. The *hairs* increase in size simultaneously with the growth of the *fungi*. *Chloroform* demonstrates the affected hairs by the change of colour it produces when applied to the suspected parts. The hairs are paler in colour, lose their elasticity, soften and break off when they have risen some one or two lines above the surface of the scalp. In the short cylinder of hair left, the fungus grows still more rapidly, so that the normal structure of the small stump soon becomes undistinguishable. There are three varieties of this disease described under the following names:—(1.) *Ringworm of the Body* (*Tinea circinatus*);

(2.) *Ringworm of the Beard* (*Tinea sycosis*); (3.) *Ringworm of the Scalp* (*Tinea tonsurans*), which is for the most part met with in children.

Treatment.—The essential point is to apply to the roots of the hairs a preparation which may destroy the fungus: if this can be done, the disease is cured. It is first of all necessary to remove the hair so as to make the surface as clean as possible. This is in part generally accomplished before the case comes under treatment, by the course of the disease; if it has not been sufficiently done, "epilation" can be accomplished by a chemical agent, or by extraction with pincers. *Sulphurous acid*, diluted with equal parts of *glycerine*, or with two to three parts of water, is to be applied on a piece of lint to the affected part, and covered with oil-skin to prevent evaporation. *Tincture of iodine* to the affected parts twice a day for fourteen days, and afterwards ointment of the *bichloride* of mercury, (*Coros. sublimat.*) After the third or fourth application of the *iodine*, the disease will cease to spread, and the hair (which may have been thinning rapidly) will cease to fall off. A kind of crust is formed by the application of the *iodine*, which will scale off in the form of a scurf when the ointment is applied.

TINEA FAVOSA—*Syn.*, FAVUS, PORRIGO FAVOSA.

Natural History.—A fungus parasitic disease, composed of cup-shaped scabs, sometimes distinct and separate, at other times indistinct or confluent. The fungi (*Achorion Schönleinii*, *Puccinia Favi*) are capable of being implanted by transference from one person to another. The hairy scalp is its most common site, but the disease may be developed on the face, neck, or limbs. The primary seat of the parasite is in the depth of the hair follicle, outside the layer of the epithelium which covers the root of the hair, and which forms the "inner root sheath" of Kölliker. By using a concentrated solution of *liquor potassæ*, to make the parts transparent, the fungus may be observed with the microscope in the follicle round the hair at the place where it passes through the epidermis. A second form of the disease is that in which the plant is found in depressions on the surface of the skin, forming the yellow honeycomb-like masses which gave the specific name *favus* to the disease, and which, from their frequent buckler-like shape, suggested the term "scutulata." A cuticular elevation is seen, beneath which is a small favus. When the cuticle is raised, a drop of pus sometimes issues; hence the error of those who have considered this disease always pustular. Generally, however, there is no pus or liquid of any kind: the plant grows, and the cuticle over it (supposing it has not been forcibly detached) finally separates, leaving the favus exposed to the air. A third form of the disease is that in which the fungus attacks the nails, and occurs for the most part in those who have been long affected with the favus of the hair follicles, the fungus taking root and germinating beneath the nail. After the spores have commenced to germinate between the superficial and deep epidermic layers, the nail becomes thickened over the affected part, and its colour becomes gradually more and more yellow, owing to the favus matter shining through it. As the fungus increases in growth, it gradually presses on the nail, rendering its longitudinal striæ very evident, and ultimately leading to the formation of fissures in it. As the pressure on the nail increases, its substance gets thinner and thinner, till perforation occurs; and then a favus cup makes its appearance externally, but more or less deformed.

Favus is the most common and the most inveterate form of scald head. The disease commences with a slight pruritus or itching of a few hours' duration, followed by an eruption of small red *vari*, sensible to the touch and to the sight. These augment in size, and before twelve hours have passed, a yellowish point forms on each of their apices, at first so small as to be only visible under a glass of considerable power. The surface appears now as if covered with specks of a sulphur-yellow colour, and each *varus* appears as if set in the skin, with an umbilicated or depressed centre.

Treatment.—As in the last-described disease, the cryptogamous parasite must be destroyed, and its germs eradicated. The best method to accomplish this is, in the first instance, to shave the head and apply a poultice till all the scabs, or nearly so, are removed; and this being effected, the whole hairy scalp, or site of the favus fungus, should be anointed with *tar ointment* (*ungt. picis liquidæ*), which has hitherto been the orthodox application. It should be applied twice a day, and before any fresh application its remains must be washed off night and morning with *soft soap* and *soft water.* The head should be shaved twice or thrice a week, and where there are other children, the affected child should be isolated as much as possible, to prevent the disease from spreading. This form of porrigo, in the early stages, will sometimes yield by washing the part with the *oleum terebinthinæ* night and morning, and cutting the hair close. Two parts of *carbolic acid* to three parts of *glycerine* and *water* used twice a day, with the daily use of *carbolic acid soap*, has been also found of service.

SCABIES—*Syn.*, ITCH.

Natural History.—Lesions consisting of an eruption of distinct slightly acuminated papules or vesicles accompanied with constant itching, due to the irritation caused by the burrowing underneath the epidermis of a female Acarus (*Sarcoptes scabei*) for the purpose of depositing her eggs, are known by this name. The eruption of scabies is more often papular than vesicular; and the characters depend partly on the length of time that the person has been affected, the number of *Acari* developed, and the degree of sensibility of the skin. It is known to infest sheep and dogs, and therefore hair does not preclude its existence; but it seems to prefer delicate parts of the skin—for example, the inner surfaces of the fingers, and folds of the skin between the fingers, the wrists and palms of the hands, the penis in the male and nipples in the female, as well as the hips, the feet, the umbilicus, and axillæ. Itching, increasing at night, first attracts attention, and is a characteristic symptom. It becomes general all over the body, and the scratching aggravates the eruption. The *prurigo* of itch is generally most expressed on the forearm, lower part of the abdomen, and the upper and inner part of the thighs. Vesicular eruption is most usual on or about the fingers and nipples of females; and pustules may be met with in children whose skin is delicate, especially on the hands, feet, and hips.

Treatment.—Such applications are to be made to the skin that, while they tend to kill the *Acari*, they will not increase the irritation of the dermis; and if the *Acari* are thus destroyed, the eruptions will in general subside in due course. If much irritation of the skin prevails, *warm baths* are to be prescribed, and *opium* may be given internally. In healthy adults the whole body of the patient ought first of all to be thoroughly scrubbed over with good *black* (*soft*) *soap*, and the process continued for at least half an hour. The patient should then get into a *warm bath*, in which he should remain for another half hour. Having thus washed and dried himself thoroughly, he is to rub himself over with an ointment in which sulphur is the active ingredient (*compound sulphur ointment*). Next morning a warm bath is to be taken, to clean the surface of the body from the remains of the anointing of the previous night. The cure ought now to be complete, so far as the destruction of the *Acari* is concerned. Specific printed directions should be given to each patient as below:—

"1st. Scrub the *whole* of your body (except the head) as firmly as possible with black soap and water.

"2nd. Sit in a hot bath for twenty minutes, or if you cannot get a bath, wash yourself with hot water thoroughly.

"3rd. Rub some of the ointment firmly into the skin of the whole body (except the head) for twenty minutes. Let the ointment remain on the body all night.

"Repeat these processes every night for three nights, and then return to shew the result to the medical attendant.

"Besides, put all your washing clothes into boiling water, and iron all your other clothes *thoroughly* with a hot iron."

If such methods are systematically carried out, itch cases ought never to occupy hospital beds, either in civil or military life.

CHAPTER XVI.

THE PERNICIOUS INFLUENCE OF POISONS.

Natural History.—The term POISON is here intended to include all substances which exercise *pernicious* (as opposed to *medicinal*) effects upon the body, tending to impair its soundness and to cause death. Such substances may be swallowed, or taken in by the breath, or otherwise absorbed through the skin or the more thin and delicate membranes, or be implanted by bites, stings, or other punctured wounds. Infectious and contagious *disease*-poisons have been already considered (see page 101, *ante*). The other poisons to be here noticed might be classified according to their mode of action on the system, as "*irritants*," "*narcotics*," or "*narcotico-irritants;*" but so numerous are the substances which may thus act perniciously upon the human body, that the subject is much too large to be dealt with at any length in these *Outlines*. The student must consult the Text-books on Toxicology or Forensic Medicine for the chemical tests and other minute details regarding them. As a branch of the Science and Practice of Medicine, the College of Physicians suggest a consideration of poisons and their effects under the following classification :—

1. *Metals and their Salts.*—The substances included under this head will be found enumerated at page 95, *ante*. The *symptoms* of poisoning from such substances are the result of irritation going on to inflammation more or less acute of the stomach and intestines, which they may even corrode or lead to ulceration, perforation, gangrene, stricture, or thickening of tissue. Burning pain in the pit of the stomach is followed by purging and colicky pains, a sense of tightness in the throat, violent cramp, and persistent vomiting, when taken into the stomach.

Treatment.—Vomiting should always be excited in cases of suspected poisoning, or where the nature of the poison is unknown. The most ready emetic is a dessert-spoonful of *flour of mustard* mixed with *tepid water;* or twenty grains of *sulphate of zinc*, or a scruple of *ipecacuanha* with a grain of *tartar emetic*, in *warm water;* and after the stomach has been well cleaned out, demulcent fluids, such as flour and water, gum water, or milk, should be freely given. When the nature of the poison is known, its *antidote*, if any, should be at once administered. Antidotes are substances qualified to neutralise chemically or otherwise the action of a poison. They are but few in number. Vomiting ought thus to be induced, in cases of poisoning by the metals and their salts, if it has not occurred, so as to empty the stomach, which is to be completely evacuated of its contents by the stomach pump, and washed out with warm water. *Astringent vegetable infusions* ought to be given as antidotes, and they might be used with the stomach pump in washing out the stomach. For *arsenic*, the best antidote is the *hydrated peroxide of iron*, diffused through water, or the precipitated *carbonate* of iron. If the arsenic has been swallowed in the form of Fowler's solution, copious draughts of *lime water* are to be given, or *oil* and *lime water*. *Diluents* and *demulcents*, such as linseed tea, are useful afterwards. For *bismuth* poisoning, milk and *sweet mucilaginous drinks* are to be given. For *copper*, *albumen*, in the form of white of eggs, must be administered. For *corrosive sublimate* the antidote is *albumen*—readiest in the form of *white of egg*. *Nitrate of silver* is neutralised by *common salt* dissolved in water. *Tartar emetic* may be rendered comparatively inert by *tannin*, *decoction of bark*, or *gall nuts*. *Chloride of zinc* in the form of *Burnett's fluid* (which contains ·25 grains of the salt in one drachm of the fluid) has proved fatal several times, either suicidally, or accidentally taken by mistake for gin or fluid magnesia. Death follows generally rapidly from the violent twofold action of the poison, as a corrosive and depresser of the nervous system. Occasionally, life has been prolonged for many days or weeks—the patient sinking at last from inanition, caused by the secondary effects of the poison on the æsophagus, stomach and intestines, tending to inflammation, thickening of the coats, constriction of pylorus, softening, ulceration, and extravasation of blood, or inflammation of the small intestines. The liver and kidneys are also directly affected.

Egg and milk must be given as an antidote, and continued as often as it is vomited in a curdled state; with copious and long-continued supplies of albuminous matter, *soap suds* may also be freely given; or the *carbonates of potash* or *soda* held in solution in copious draughts of warm water, would act as an antidote by throwing down insoluble *carbonate of zinc*, and at the same time act as an emetic. For *lead*, *sulphate of magnesia* and *phosphate of soda* are the best antidotes for its soluble salts. It is one of the most insidious of cumulative poisons, producing results which require consideration as a substantive disease, namely,

Lead Colic and Palsy.

Natural History.—A series of morbid phenomena may be induced by the absorption of the salts of lead contained in solution (even one-fortieth to one-fiftieth of a grain per gallon) in drinking-waters, or in various foods and drinks, or conveyed into the system through the integuments of those who are in the habit of handling the soluble salts of lead; or through the pulmonary mucous membrane of those exposed to the influence of vapours containing lead. The lead being absorbed, produces a peculiarly painful affection of the alimentary canal, termed *lead colic*, or *painter's colic* (eq. *colum ex plumbo*). It may also affect the muscles of the extremities, producing palsy; and finally it produces ulceration of the gums and alveolar processes, accompanied by a peculiar blue line seen along the free margin of the gums, but absent where a tooth or stump is wanting, and most marked in those who do not clean their teeth. A stain also from lead sometimes affects the conjunctiva. The fact of the lead being absorbed and mingled with the blood is demonstrated by the circumstance that lead has been obtained from the coats of the stomach of animals poisoned by lead, even as late as a month after poisoning. It appears, also, that there are various tissues and organs of the body in which lead accumulates more than in others—the spleen, then the liver, afterwards the lungs, then the kidney, next the heart, and the least amount in the intestines. In cases of slow poisoning with lead, the metal comes to be diffused through the entire body, and manifests its poisonous action by impaired digestion, emaciation, and sallowness of the skin; and lead, having once entered the body, leaves it again very slowly, so that long after an animal has ceased to receive lead in its food or drink, or by any other medium, we may expect to find the metal in its tissues; and restoration to health is always protracted. The lead passes off by the urine sometimes in large quantities, but very slowly. *Colica Pictonum* rarely causes death. Sometimes all the most pernicious effects of lead are produced by one dose taken by the mouth, causing acute symptoms of poisoning, generally from the *acetate* or *sub-acetate*. There is thirst, vomiting, abdominal tenderness, constipation, and occasional severe colic, relieved by firm pressure over the umbilicus. There is at the same time excessive prostration, cold sweats, and giddiness. If introduced by the skin, as by ointments, months, even years, may elapse before the system is laid under its influence. As a general rule, however, a much smaller dose will produce *colic* than is necessary to produce *palsy*. The duration of the constipation which attends *colica Pictonum* may be three or four days, but fifteen days have been known to elapse without a stool. As soon as the bowels act, the great severity of the disease is mitigated; every symptom is gradually relieved, and the disease generally terminates within a week. When *palsy* is the result of the absorption of lead, a painful state of the arms and calves of the legs, with cramps also of the joints, uterus, penis, and scrotum, often precedes it, as well as repeated attacks of the characteristic *colic.* The nerves of the forearm and hand become first affected, and the affection is in general limited to the upper extremities; the extensor muscles of the hands and fingers become paralysed, so that when the arms are stretched out the hands hang down by their own weight, causing what the patients term "*wrist drop.*" The muscles of the ball of the thumb waste. The duration of the palsy is always long, and often lasts many months, and in some cases years, and it may become general with great wasting.

Treatment.—The objects to be obtained are, alvine evacuations, a copious discharge of urine, and perspiration, with a view of eliminating the poison. To allay pain is also an urgent necessity. For these purposes five grains of *calomel*, fifteen grains of *jalap*, and one grain of *opium*, should be administered as soon as the patient is seen; and at the end of two hours about two ounces of *camphor mixture*, combined with a drachm of *sulphate of magnesia* and twenty minims of *tincture of hyoscyamus*, may be given every two or every four hours, till the bowels are freely evacuated, when relief more or less complete is obtained. The mixture should be continued at proper intervals for three, four, or five days. Lead is removed from the body mainly by the kidneys; and *iodide of potassium* promotes the elimination of lead in this way. It may be used with advantage combined or not with the *citrate of iron*—the use of *iron* in some form or other having been found of benefit in cases of palsy from lead contamination. *Galvanism*, in the form of *Faradisation*, ought to be used as a local stimulant to the nerves, with the precaution that its application is not to be continued too long each time. Ten or fifteen minutes, at three different periods of the day, or of every second day, and persevered in for not less than four weeks, will be found of great service. In acute poisoning, vomiting is to be induced and maintained by luke-warm water, or the stomach pump used if vomiting is abortive; *sulphate of soda*, *Epsom salts*, or *fresh precipitated sulphide of iron*, is to be given or passed into the stomach; and also *milk* with *white of eggs.* The *sulphate of magnesia* overcomes the obstinate constipation better if given with *sulphuric acid*, in *peppermint water* with *tincture of hyoscyamus.* As an antidote, it is believed to form an insoluble *sulphate of lead.*

2. *Caustic Alkalies.*—These are enumerated at page 95, *ante.* The *symptoms* of poisoning from them are a violent, caustic, burning sensation, acrid taste in the mouth, great heat of the throat, with destruction of the epithelial covering; difficult and painful swallowing; vomiting of bloody matter, turning yellow *turmeric paper* brown; acute pain in the stomach, colic, and purging of bloody stools, with membranous shreds. Cold sweats and hiccup precede fatal collapse.

Treatment is by *vegetable acids*, such as *lemon juice*, *citrate and tartaric acid* in solution, also *vinegar* and *water*, after which *milk* should be given. The fixed oils, such as linseed and olive oil, may form soaps with free alkalies.

3. *Metalloids.*—These are enumerated at page 95, *ante.* The *symptoms* are similar to those of the corrosive metals—pain at epigastrum, vomiting, diarrhœa, collapse, and death.

Treatment.—In cases of poisoning from *iodine*, as it combines with starch, forming an insoluble compound, wheat flour or arrow-root should be given suspended in water or milk, and vomiting promoted by large draughts of gruel or warm water. As to *phosphorus*, there is no antidote. An emetic should be promptly given, followed by *mucilaginous* drinks with *magnesia* suspended in them.

4. *Acids.*—These are enumerated at page 96, *ante.* The *symptoms* generally are those of powerfully corrosive and therefore irritant results, going on to inflammation of the œsophagus, stomach, and bowels.

Treatment.—By *carbonate of lime*, *common chalk*, *whiting*, *prepared chalk*, or *compound chalk-powder*, *calcined magnesia*, or *carbonate of magnesia;* with dilute solutions of *carbonate of soda* or *potash* as antidotes given in water, after which milk is to be freely given.

5. *Vegetable Poisons.*—These are named at page 96, *ante.* Their general effects are either *irritant* or *narcotic*, or a combination of both. The *irritant* poisons are attended with more or less bitterness of taste, excessive heat, and great dryness of the mouth and throat, vomiting, purging, and great pain in the stomach and bowels, delusion and symptoms of intoxication or coma. The *narcotic* poisons are typically represented by *opium* and its preparations. Their effect is that of *benumbing* (*narcosis*), inducing, in from one to two hours, more or less profound stupor; and their poisoning influence is made manifest by vertigo, nausea, and a condition resembling alcoholic intoxication or apoplexy, or uræmic coma—delirium, blunted sensations, heavy sleep, with stertorous breathing, a pulse full and frequent, gradually becoming slow as the breathing becomes slower and slower and less complete, till death takes place from paralysis of the respiratory muscles.

The pupils are greatly contracted. Convulsions may occur before death.

Treatment.—By *emetics* of *sulphate of zinc*, in doses of *ten* to *twenty grains*, or *tartar emetic* in *four* to *five grain* doses, repeated at an interval of a quarter of an hour. *Enemata* of *soap* and of *salt and gruel* are also to be used. The *salts of ammonia* applied to the nostrils and the *cold douche* are called for in poisoning by narcotics. In opium poisoning the stomach will not easily respond to emetics; therefore the stomach pump must be used without any delay, and the patient kept roused and in constant movement to prevent sleep. No *alcohol*, but *strong coffee* should be given, if fluid can be taken; and it may be hopeful to maintain even artificial respiration. The best antidotes for the common *bitter* vegetable poisons (such as wild parsley, water hemlock, common celandine, and meadow saffron) are *acids*, *astringents*, *alcohol*, and *spices*. The *acrid* vegetable poisons (such as aconite, bane-berry, sumach) are best treated by strong astringents, such as decoctions of bark, tannin; also milk, oils, and fats. The *stupifying* vegetable poisons (such as deadly garden and woody nightshade, fool's parsley or lesser hemlock, thorn apple, henbane, wild lettuce) are best treated by *emetics* and *vegetable acids*. The *fœtid* poisons (such as common hemlock, foxglove, hellebore or bear's foot, and savin) are to be counteracted by *ether*, *alcohol*, and *acids*. For the *drastic* vegetable poisons (such as common or white briony, spurge and white hellebore) the antidotes are *acids* and *astringents*. Of these poisons two (*ergot* and *alcohol*) require special notice, as giving rise to substantive diseases, namely:—

Ergotism.

Natural History.—A train of morbid phenomena produced by the slow and cumulative action of a specific poison in a fungus peculiar to wheat and rye. This poison gives rise to convulsions, or spasmodic contractions of the muscles, gangrene of the extremities, and death, or to symptoms of ill-health. *Wheat*, *rice*, and such-like grains, are equally injurious when similarly unsound; and the most frequent form of this unsoundness consists in the development of a fungus (the *Ergotœtia abortifaciens* or *cockspur*) upon the grain, to which the name of *ergot* has been given. In this ergot fungus there is a large proportion of fixed oil, which has the effect of exciting the uterus to powerful and continuous contractions. The peculiar mortification which follows the use of diseased rye generally begins in one or both feet, with pain, redness, and a sensation of heat as burning as fire. At the end of some days these symptoms cease as quickly as they come on, when the sensation of extreme heat is changed to cold. The part affected becomes black, like a piece of charcoal, and as dry as a cinder. A line of separation tends to form between the dead and the living parts, like that which appears in the separation of a slough produced by the application of the cautery, or as in the cases of senile gangrene.

Treatment.—The cause or source of the ergotism, in the first instance, must be ascertained and removed. To obviate the effects it has already produced, the constitutional treatment must be directed to improve the state of the blood. *Tonics* and *stimulants* are to be administered, after a free employment of *evacuant remedies*, to clear out the alimentary canal completely. The *chlorates of potash* and of *soda*, with *anti-spasmodics*, *tonics*, and *narcotics*, are especially indicated. *Camphor*, *musk*, *ammonia*, and *capsicum*, may be particularly mentioned; and the strength of the patient is to be supported by light, nourishing, and wholesome food.

Alcoholism and Delirium Tremens.

Natural History.—A train of morbid phenomena, produced by the slow and cumulative action of *alcohol*, in the various forms in which it is used as a drink. Delirium is one of the most prominent features of the morbid state, which is otherwise characterised by hallucinations, dread, tremors of the tendons and muscles of the hands and limbs, watchfulness, absence of sleep, great frequency of pulse. A thick, creamy fur loads the tongue, and a cool, humid, or perspiring surface prevails; while the patient gives forth a peculiar odour, of a saccharo-alcoholic description, more or less strong. These effects of alcohol have only been recognised and described since the beginning of this century; and the term *alcoholism* is used to denote various symptoms of poisoning which are capable of being traced to the use of stimulants containing alcohol. This term is used in the sense analogous to that in which we use the terms *mercurialism*, *ergotism*, *narcotism*, *iodism*, and the like—the agents inducing these specific states acting after the manner of a cumulative poison. It is now a matter of fact, determined by direct experiment, as well as by casual observation, that alcohol is absorbed directly into the circulation, and is capable of acting as a direct poison upon the nervous tissue through which the poisoned blood circulates. It has been found in the blood, in the urine, in the bile, in the fluid of the serous membranes, in the brain matter, and in the liver. Its odour can be easily detected in the breath; and the habitual immoderate drinker exhales a distinct alcoholic and saccharine odour more or less strong. This odour is generally well expressed in cases of *delirium tremens*. The essential nature of *delirium tremens* is associated with the loss of cerebral power, evinced especially in the want of control over thoughts, emotions, and muscular action, consequent on the direct influence of the alcoholic poison. Disturbances of function, depression, and debility are the attendant phenomena. The feeble but rapid action of the heart, the tremulous undecided action of the muscles, and the terror-stricken and agitated mental state betoken the depressed condition of all the living functions. The amount of phosphates in the urine is diminished, while the proportion of the sulphates and of the urea is greatly increased. The disease has been variously named the *brain fever of drunkards*, *dipsomania*, or *delirium tremens*, by which latter name it is more frequently known and described in this country.

Treatment.—The indications are,—(1.) The elimination of the *alcohol;* (2.) the sustenance of the patient during this period. The two most fatal errors which can be committed in the treatment of *delirium tremens* are either to *bleed* the patient or to give him *opiates.* The cases of those treated by opiates are apt to terminate by convulsions and coma. The strength must be supported by *diet* of the most nutritious kind, in a fluid and mild form, such as *yolk of eggs*, *soups*, and the like; food should be given in small quantities and often. *Beef-tea*, *soup*, and *egg-flip*, spiced with *Cayenne pepper*, or *Capsicum*, are each to be commended at different periods of the day. Arrangements should be made so that the patient does not catch cold; and if he continues to digest food, the danger is much diminished. The danger in the first instance is from exhaustion; and careful nursing is above all things necessary, so that protection may be adequate and the food adapted to the state of the digestion, which is always feeble. The disease must be treated as one spontaneously curable; not by withholding remedies, but by using them in strict subordination to good nursing in a darkened room, with carefully adjusted diet and regimen. Adopt such means as are calculated to restore the powers of nature—nutrients and rest; while the stimulus of such a spice as *Cayenne pepper*, or *Capsicum* in the form of *tincture*, given in the soup, on the atonic stomach, will have a favourable influence on absorption. *Capsicum* also induces sleep if given early in doses of 20 or 30 grains. I have given as much as a small tea-spoonful of Cayenne pepper with the desired result of sending the patient to sleep. In some cases purgative remedies are indicated from the first. These cases are known by the flushed, bloated appearance, the very foul tongue, the *mawkish*, peculiar odour of the breath, the fetid discharges from the bowels, and the history of a recent surfeit of eating as well as drinking. *Opium* may be administered with safety and advantage only in protracted cases, provided the quantity given in twenty-four hours is never allowed to exceed the full dose which would be considered safe for a healthy person of the age and sex of the patient.

6. *Of poisoning from fungi*, the symptoms are mainly — vomiting, purging, and thirst, convulsions and faintings, tending to collapse with delirium, dilated pupil, and coma.

Treatment must be by emetics of *zinc* or *antimony*, followed by purgation by *sulphate of soda* or *sulphate of magnesia;* after which *chloric ether* (*spirit of chloroform*) is to be given in frequent small doses, or *brandy and water*.

7. *Animal Poisons.*—These are mainly in the form of unwholesome meat, decaying or changing in a peculiar way, as in poisonous sausages. Milk also is sometimes poisonous; and may be contaminated by the specific poison of enteric fever, when mixed with water itself so contaminated. Some cheese and certain conditions of some fish are also poisonous (see page 96, *ante*). The *symptoms* of fish poisoning come on in an hour or two after eating the unwholesome fish, with stomachal indigestion, giddiness, and headache, sometimes *urticaria*, generally vomiting, and sometimes fatal collapse.

Treatment is by *emetics*, followed by *purgatives* and *alkaline* drinks.

8. *Gaseous Poisons.*—See page 96, *ante. Symptoms* of chlorine poisoning, when inhaled, are those of violent suffocation, and irritation tending to severe inflammation of the air-passages and lungs, with bloody expectoration. *Carbonic acid* can only be breathed after dilution with two or more volumes of air, and atmospheric air is deadly if it contains more than *one-tenth* of its volume of that gas. It causes vertigo, sleepiness, and complete prostration of muscular power, the breathing becomes stertorous, and death takes place by coma.

Treatment.—The antidotes to *chlorine* inhalation are *ammonia vapours*, and *sulphuretted hydrogen* very cautiously inhaled. *Artificial respiration* may be of use in poisoning from *carbonic acid* after removal from the poisoned atmosphere, and if the surface is warm *the cold douche* to the head and spine is to be used; if the surface is cold, *the warm bath.* When respiration is re-established, *venesection* may be useful and necessary to relieve the cerebral blood-vessels.

The reader is referred back to page 101 relative to the specific action of morbid poisons; and also to what has been written on poison-wounds under the subjects of glanders, farcy, hospital gangrene, erysipelas, pyæmia, and hydrophobia.

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